Clinical Practice Guideline

Urinary Incontinence in Adults

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U.S. Department of Health and Human Services
Public Health Service
Agency for Health Care Policy and Research

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The legislation also established within AHCPR the Office of the Forum for Quality and Effectiveness in Health Care (the Forum). The Forum has primary responsibility for facilitating the development, periodic review, and updating of clinical practice guidelines. The guidelines will assist practitioners in the prevention, diagnosis, treatment, and management of clinical conditions.

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Guidelines are available in formats suitable for health care practitioners, the scientific community, educators, and consumers. AHCPR invites comments and suggestions from users for consideration in development and updating of future guidelines. Please send written comments to Director, Office of the Forum, Executive Office Center, Suite 401, 2101 East Jefferson Street, Rockville, MD 20852.

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Guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical conditions. This guideline was developed by an independent, multidisciplinary panel of private sector clinicians and other experts convened by the Agency for Health Care Policy and Research (AHCPR). The panel employed an explicit, science-based methodology and expert clinical judgment to develop specific statements on patient assessment and management for the clinical condition selected.

Extensive literature searches were conducted and critical reviews and syntheses were used to evaluate empirical evidence and significant outcomes. Peer review and field review were undertaken to evaluate the validity, reliability, and utility of the guideline in clinical practice. The panel's recommendations are primarily based on the published scientific literature. When the scientific literature was incomplete or inconsistent in a particular area, the recommendations reflect the professional judgment of panel members and consultants. In some instances, there was not unanimity of opinion.

The guideline reflects the state of knowledge, current at the time of publication, on effective and appropriate care.[1] Given the inevitable changes in the state of scientific information and technology, periodic review, updating, and revision will be done.

We believe that the AHCPR-assisted clinical guideline development process will make positive contributions to the quality of care in the United States. We encourage practitioners and patients to use the information provided in this clinical practice guideline. The recommendations may not be appropriate for use in all circumstances. Decisions to adopt any particular recommendation must be made by the practitioner in light of available resources and circumstances presented by individual patients.

J. Jarrett Clinton, M.D.
Administrator
Agency for Health Care Policy and Research

[1]For a complete list of the literature surveyed, see the bibliography of *Urinary Incontinence in Adults: Guideline Report* (AHCPR Publication No. 92-0039). Rockville, MD: Agency for Health Care Policy and Research. In press.

Foreword

Urinary incontinence (UI) affects approximately 10 million Americans, mostly elderly, in community and institutional settings. Despite its prevalence, and an estimated annual cost of $10 billion, most affected individuals do not seek help for incontinence, primarily because of embarrassment or because they are not aware that help is available. When individuals do seek help, evidence exists that practitioners are hesitant to discuss the problem or do little to assess or treat it properly.

A number of Federal and private organizations have provided research funding for the study of UI. Data from these studies indicate that treatment of UI is effective in most people, but there is an increased need for efforts to inform and educate the public and health care providers about the problem. Furthermore, evidence exists that there are wide variations in the actual costs and methods of providing care for UI, in the actual costs per procedure, and the charges within each diagnostic group.

It is expected that UI will continue to be a significant health care problem in the elderly and institutionalized populations, and will, in fact, increase as the population of America continues to age.

This clinical practice guideline adresses major evaluative, diagnostic, treatment, and management issues of UI. It was developed under the sponsorship of the Agency for Health Care Policy and Research (AHCPR), Public Health Service, U.S. Department of Health and Human Services. To develop the guideline, AHCPR convened an interdisciplinary, expert panel made up of physicians, nurses, gerontologists, other allied health professionals, and consumers. The panel first undertook an extensive and interdisciplinary clinical review of current needs, therapeutic practices and principles, and emerging technologies for diagnosis and treatment of UI. Second, the panel conducted a comprehensive review of the field to define the existing knowledge base and critically evaluate the assumptions and common wisdom in the field. Third, the panel initiated peer review of guideline drafts and field review with intended users in clinical sites. Comments from these reviews were assessed and used in developing the guideline.

This is the first edition of the *Clinical Practice Guideline on Urinary Incontinence in Adults*. Further editions will be produced as needed to reflect new research findings and experience with emerging technologies for UI diagnosis and treatment.

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June Abbey, PhD, RN
Alexandre Afanasyev, MD
Dorothy Baker, PhD
Margaret Bauman, MD
Jerry Blaivas, MD
Richard Bump, MD
Kathryn Burgio, PhD
Nancy Creason, PhD, RN
Tony E. Fogarty, MA, MPH
Katrina Gahelko, PhD
Cheryl Gartley,
Simon Foundation
H. Roger Hadley, MD
Regula Herzog, PhD
Jessie Igou, PhD, RN
Katherine Jeter, HIP
Harold Kamintsky, MD
Aaron Kirkemo, MD
Edna Laurino, RN
Robert D. Mayer, MD
Winston Mebust, MD
Marilyn Pires, RN
Virginia Rice, Lunaria
Joseph Salisz, MD
Jack Shelton
Henry Thiede, MD
Diane Smith, RN, MSN, CRNP

and Presenters at the Open Forum:

Maren Anderson
Agnes Buchanan, RN
Rebecca Chalker, MA
Mikel Gray, PhD
Herbert Luger
Peter Preziosi
Dr. Rick Russell
Eva Winkle
Kristy Wright, RN

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Abstract

Despite the prevalence of urinary incontinence (UI), it is widely underdiagnosed and underreported. Two reasons are that many practitioners remain uneducated about this condition and individuals are often too ashamed or embarrassed to seek professional help. Further, there are significant variations in UI diagnostic and treatment practices as well as associated medical costs. These factors and statutory criteria prompted the need to develop a guideline for urinary incontinence in adults. A panel of experts used an extensive review of scientific literature as well as expert judgment and group consensus to develop this guideline. Basically, it is a series of recommendations for identifying and evaluating UI; use of behavioral, pharmacologic, and surgical treatment as well as supportive devices; and education of health professionals and the public. The panel found evidence in the literature that the treatment of UI can improve or cure most patients. They concluded that surgery, except in very specific cases, should be considered only after behavioral and pharmacologic interventions have been tried and that vigorous efforts should be made to educate the professional and lay public.

Panel Members

Kathleen A. McCormick, PhD, RN, FAAN, *Co-Chair*[2]
Director, Forum for the Quality and Effectiveness in Health Care
Agency for Health Care Policy and Research
Specialty: Nursing

Ananias Diokno, MD, *Co-Chair*
Chief, Department of Urology
William Beaumont Hospital
Royal Oak, Michigan
Specialty: Urology

Joyce Colling, PhD, RN, FAAN
Professor and Chairperson
Community Health Care Systems Department
School of Nursing
Oregon Health Sciences University
Portland, Oregon
Specialty: Nursing

J. Andrew Fantl, MD
Professor, Department of Obstetrics and Gynecology
Medical College of Virginia
Richmond, Virginia
Specialty: Obstetrics/Gynecology

Richard Loughery, BA, FACHA
Consultant
McLean, Virginia
Specialty: Hospital Administration, Consumer Representation

Diane Kaschak Newman, RN, MSN, CRNP
President, Golden Horizons, Inc.
Newtown Square, Pennsylvania
Specialty: Nursing

Joseph Ouslander, MD
Medical Director
Jewish Homes for the Aging
Associate Professor
Multicampus Division of Geriatric Medicine and Gerontology
UCLA School of Medicine
Reseda, California
Specialty: Geriatrics

Betty Pearson, PhD, RN
Associate Professor
School of Nursing
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin
Specialty: Nursing

Shlomo Raz, MD
Professor of Surgery/Urology
UCLA School of Medicine
Los Angeles, California
Specialty: Urology

Neil M. Resnick, MD
Chief of Geriatrics
Brigham and Women's Hospital
Boston, Massachusetts
Specialty: Geriatrics

[2]Dr. McCormick was Nursing Research Director, National Institutes of Health, National Institute on Aging, LBS, GRC, Baltimore, MD, during the time this guideline was written.

Thomas J. Rohner, Jr., MD
Chief, Division of Urology
Pennsylvania State University
Hershey Medical Center
Hershey, Pennsylvania
Specialty: Urology

Jack Schnelle, PhD
Associate Director and
Professor-in-Residence
Borun Center for Gerontological
Research
UCLA School of Medicine
Los Angeles, California
Specialty: Psychology, Gerontology

Jeannette Tries, MS, OTR
Sacred Heart Rehabilitation Hospital
Milwaukee, Wisconsin
Specialty: Occupational Therapy,
Psychology

Vernon Urich, MD
Private Practice
Flint, Michigan
Specialty: Urology, Health Educator

Michael Vernon, MD
Director of Geriatrics
Associate Professor
Department of Family Medicine
School of Medicine
East Carolina University
Greenville, North Carolina
Specialty: Family Practice

Consultants

Faye G. Abdellah, EdD, DSc, RN, FAAN (Consultant)

Deborah R. Erickson, MD (Consultant)

David Hadorn, MD (Consultant, algorithm)

Teh-Wei Hu, PhD (Consultant, economics)

Department of Health and Human Services Liaisons

National Institute on Aging:
T. Franklin Williams, MD

Centers for Disease Control:
Matthew Zack, MD, MPH

Health Care Financing Administration:
Rose Connerton

National Library of Medicine:
Kristine Scannell

Food and Drug Administration:
E. Stewart Crumpler

Agency for Health Care Policy and Research:
Kathleen E. Hastings, JD, RN
Gloria A. Hernandez, MSN, RN
Kathleen Weis, DPH, RN
Randie A. Siegel, BA
Rosita McKee, PA, MPH

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Executive Summary

Urinary incontinence (UI) plagues 15-30 percent of noninstitutionalized persons over age 60 and at least half of the 1.5 million nursing home residents. Because of the social stigma of UI, many sufferers do not even report the problem to a health professional. In addition, when it is reported, many physicians and nurses, who need to be educated in this area, fail to pursue investigation of UI. As a result, this medical problem remains vastly underdiagnosed and underreported.

The prevalence of UI, its toll on physical and psychological health, large variations in UI care practices and costs, and the urgent need to educate health care professionals and the public about this condition prompted the selection of UI as a clinical guideline topic.

The purpose of this guideline is to improve reporting, diagnosis, and treatment of UI; reduce variations in clinical practice; educate health professionals and consumers about this condition; and, finally, encourage further biomedical, clinical, and cost research on UI. The guideline should help clinicians, patients, and patients' families understand the assessment, management, and treatment of UI in adults.

These recommendations apply to the diagnosis and treatment of acquired incontinence in ambulatory and nonambulatory patients in outpatient, inpatient, and long-term care settings. Extraurethral UI, which is involuntary loss of urine through channels other than the urethra, is not addressed.

To develop the guideline, AHCPR convened an interdisciplinary non-Federal panel of physicians, nurses, allied health professionals, and health care consumers. The panel conducted an extensive literature review of UI in adults, heard public testimony at a national hearing, and examined information gathered from consultants. It studied the effectiveness and appropriateness of diagnostic and treatment procedures for UI, how they affect outcomes important to patients, their benefits and adverse consequences, and costs incurred from their use.

The panel found evidence in the literature that the treatment of UI can improve or cure most patients. It determined that UI in the adult requires a comprehensive approach by health professionals in the initial evaluation and treatment with behavioral and pharmacologic interventions and requires specialists for further diagnostic evaluation and surgical intervention.

The guideline provides practice recommendations in three areas:

- **Identification and evaluation**

  The identification and documentation of UI can be improved with more thorough medical history taking, physical examination, and

recordkeeping. Routine tests of lower urinary tract function should be performed for initial identification of UI. Situations that require further evaluation by qualified specialists include: uncertain diagnosis, lack of correlation between symptoms and clinical findings, failure to respond to adequate therapeutic trial, hematuria without infection, presence of other comorbid conditions, and confirmation of diagnosis of incontinent patients being considered for surgical therapy. The specialized tests recommended for further diagnosis are detailed.

- **Selection of appropriate therapy**

  The guideline provides an informed framework for selecting appropriate behavioral, pharmacologic, and surgical treatments and supportive devices that can be used to treat UI. The panel concluded that behavioral techniques such as bladder retraining and pelvic muscle exercises are effective, low-risk interventions that can reduce incontinence significantly in varied populations. The guideline outlines what drugs can be used effectively for certain types of incontinence, including doses and possible side effects.

  The guideline recommends that surgery, except in very specific cases, should be considered only after behavioral and pharmacologic interventions have been tried. The panel outlines several surgical options and their risks for particular UI problems.

- **Education of health professionals and the public**

  Finally, the guideline calls for vigorous efforts to educate health care professionals about this condition so that they are sufficiently knowledgeable to diagnose and treat it. It recommends that the public be advised to report incontinence problems once they occur and be informed that incontinence is not inevitable or shameful but is a treatable or at least manageable condition.

This is the first edition of the guideline *Urinary Incontinence in Adults*. Further editions will reflect new research findings and experience with emerging technologies and innovative approaches for UI assessment and relief.

The Agency for Health Care Policy and Research and the Guideline Development Panel welcome comments and suggestions on the guideline for use in the next edition. Please address written comments to: Director, Office of the Forum, Agency for Health Care Policy and Research, 2101 East Jefferson Street, Suite 401, Rockville, MD 20852.

1 Overview

Introduction

On December 19, 1989, the Omnibus Budget Reconciliation Act (Public Law 101-239) added a new Title IX to the Public Health Service Act establishing the Agency for Health Care Policy and Research (AHCPR). AHCPR's goal is to enhance the quality, appropriateness, and effectiveness of health care services and access to such services. Section 911 of the Act establishes within AHCPR the Office of the Forum for Quality and Effectiveness in Health Care. Section 912 directs the Forum to facilitate the development and periodic review and updating of:

> Clinically relevant guidelines that may be used by physicians, educators and health care practitioners to assist in determining how diseases, disorders, and other health care conditions can most effectively and appropriately be prevented, diagnosed, treated, and managed clinically.

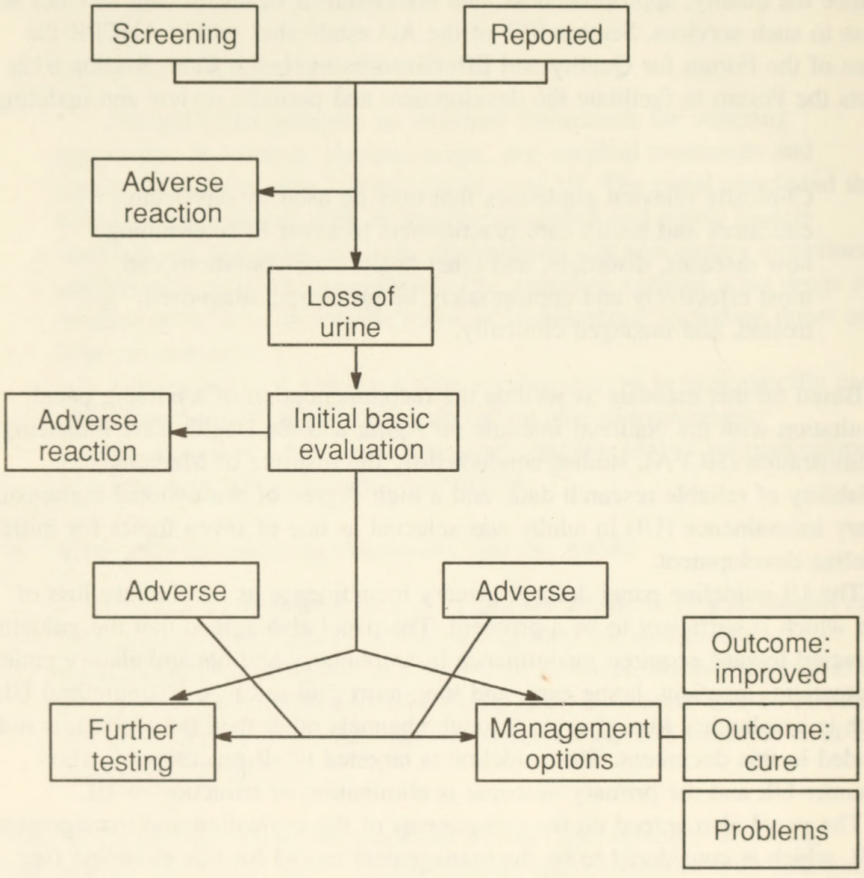
Based on this mandate as well as the recommendation of a nursing panel, consultation with the National Institute on Aging and the Health Care Financing Administration (HCFA), studies conducted by the Institute of Medicine, availability of reliable research data, and a high degree of professional consensus, urinary incontinence (UI) in adults was selected as one of seven topics for initial guideline development.

The UI guideline panel defined urinary incontinence as involuntary loss of urine which is sufficient to be a problem. The panel also agreed that the guideline is directed toward acquired incontinence in ambulatory and nonambulatory patients in outpatient, inpatient, home care, and long-term care settings. Extraurethral UI, which is involuntary loss of urine through channels other than the urethra, is not included in this document. The guideline is targeted to all practitioners who encounter UI, and the primary outcome is elimination or reduction of UI.

The panel also agreed on the components of the evaluation and management of UI, which is considered to be the management model for this guideline (see Figure 1). *Urinary Incontinence in Adults*, which seeks to improve the care of incontinent adults, makes seven broad-based recommendations. These are to:

1. Improve the education and dissemination of UI diagnosis and treatment alternatives to the public and to health care professionals;

Figure 1. Management model



2. Educate the consumer to report incontinence problems once they occur;
3. Improve the detection and documentation of UI through better history taking and health care recordkeeping;
4. Establish appropriate basic evaluation and further evaluation;
5. Recommend the staging of appropriate treatment;
6. Reduce variations among health care professionals; and
7. Encourage further biomedical and clinical research on prevention, diagnosis, and treatment of UI in the adult and encourage further cost research.

The panel has conducted an extensive literature review on UI in adults, heard public testimony at a national hearing, and reviewed information from consultants. It also sought further evidence of the costs of UI, variations in practice and payments, the prevalence of incontinence in hospitals, and the incidence of UI in outpatient, rehabilitation, and home settings. Previous research data and expert opinions helped to provide insight into the problem within the community, acute care facilities, and nursing homes. The draft document was also extensively peer reviewed by individual experts and representatives of the various professional and public organizations, and many of their recommendations were incorporated into the document.

The panel found evidence that treatment of UI is effective in most people; but underreporting of UI, services improperly or poorly documented, and major variations in diagnosis and treatment were identified as significant problems.

Prevalence

Among the population between 15 and 64 years of age, the prevalence of UI in men ranges from 1.5 percent to 5 percent and in women, 10 percent to 25 percent (Thomas, Plymat, Blannin et al, 1980). In one series of randomly selected women (30-59 years old), 26 percent reported having experienced UI at some time in adult life, and 14 percent had perceived UI as a social or hygienic problem (Elving, Foldspang, Lam et al, 1989).

For noninstitutionalized persons older than 60, the prevalence of UI ranges from 15 percent to 30 percent, with women having twice the prevalence of men. Between 25 percent and 30 percent of those identified as incontinent have frequent incontinence episodes, usually daily or weekly (Diokno, Brock, Brown et al, 1986; Resnick, Wetle, Scherr et al, 1986).

Among the more than 1.5 million nursing facility residents, the prevalence of UI is 50 percent or higher, with incontinence episodes generally occurring more than once per day (National Nursing Home Survey, National Center for Health Statistics, 1979).

Clinical, Psychological, and Social Impact

Less than half of those individuals with UI living in the community consult health care providers about the problem. Urinary incontinence is rarely detected and reported by hospital personnel, masking its true extent and clinical impact. Instead, many people with UI turn prematurely to the use of absorbent materials and supportive aids without having their condition properly diagnosed and treated. Dependence on caregivers increases as incontinence worsens, and the homebound frequently use indwelling catheters and other supportive devices, which increase the risk of urinary tract infections (UTIs), morbidity, and mortality.

The psychosocial impact of UI imposes a burden on individuals, their families, and health care providers. Although further research is needed, women with UI are often reported to be depressed and embarrassed about their appearance and odor (Wyman, Harkins, Choi et al, 1987). Consequently, excursions outside the home, social interaction with friends and family, and sexual activity may be restricted or avoided entirely in the presence of incontinence (Harris, 1986).

Costs

A highly conservative estimate (Hu, 1990) of the direct costs of caring for persons of all ages with incontinence is $7 billion annually in the community and $3.3 billion in nursing homes (based on 1987 dollars).

Data show that there are widespread variations in the costs of providing care for UI (Hu, 1992). Those findings are summarized as follows:

1. There has been minimal utilization of diagnostic procedures in either the outpatient or inpatient setting, including urinalysis, one of the basic tests. Also, biofeedback (or bladder training) has not been frequently used as a first-line treatment procedure.

2. The variation of costs of a particular procedure across diagnoses is relatively small in the outpatient setting. However, the costs of a particular procedure across diagnoses vary widely in both the MEDSTAT

and MEDPAR inpatient data.[1] The variation is wider in the MEDSTAT data than the MEDPAR data, as shown by their respective ratio between the standard deviation and its mean.

3. MEDSTAT data report actual payment for treatment and MEDPAR data report charges for treatment. MEDSTAT reported that total treatment costs (payment) are two to three times higher than the MEDPAR data charges for treatment.

The issue of cost implications should also be addressed. Based on current practice costs in the private sector (MEDSTAT) and the identified treatment protocol using stress and retention (overflow) UI, the study has found that there will be an overall cost savings if the guideline is to be implemented.

1. For stress incontinence there would be a saving of $105 per episode in the outpatient and $535 in the inpatient setting.

2. For retention incontinence (overflow), there would be a total cost saving of $83 per episode in the outpatient and $1,025 in the inpatient setting.

3. Based on information from the 1990 National Hospital Discharge Survey (Hu, 1991), there were 53,000 patients discharged with a primary diagnosis of stress incontinence, of which 38,000 were less than 65 years of age. The total estimated savings from using the guidelines for episodes of stress incontinence in individuals under age 65 would be approximately $20.3 million per year. The total estimated savings for retention (overflow) UI among the 21,000 individuals under age 65 discharged in 1990 would be $21.5 million.

It should be noted that cost figures estimated in this report do not include the potential cost increases in service utilization for those who are not currently in the medical care services system. It is possible that, because of the guideline, more individuals will become aware of the problem of UI and realize the benefits of seeking the treatment protocols recommended by the guideline.

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[1]MEDSTAT Systems is a private corporation that maintains and sells its data base on the cost, frequency, and utilization of health services based on private health insurance claims data. Its address is 777 E. Eisenhower Pkwy, Suite 500, Ann Arbor, MI 48108. MEDPAR data are Medicare health claims data that are compiled by the Health Care Financing Administration, Bureau of Management and Strategy, Baltimore, MD 21207.

Causes and Types of Urinary Incontinence

Urinary incontinence can be caused by pathologic, anatomic, or physiologic factors affecting the urinary tract as well as factors outside of it. Many of these factors can be reversed, such as infection, atrophic vaginitis, acute confusional states, restrictions in mobility, fecal impaction, medical conditions that cause polyuria or nocturia, and drug side effects (see Table 1 for common causes, mechanisms, and management of transient UI). Often multiple and interacting factors contribute to UI development, especially in frail patients (Ouslander and Bruskewitz, 1989). In such patients, therefore, the diagnostic evaluation must be comprehensive, focusing not only on the lower urinary tract, but also on the patient's general medical and functional status. In evaluating an individual with UI, it is important to identify the type(s) and cause(s) of the incontinence. A good start is to characterize the reported or observed urine loss.

Urge Incontinence

Urge incontinence is the involuntary loss of urine associated with an abrupt and strong desire to void (urgency). Urge incontinence is usually, but not always, associated with the urodynamic findings of involuntary detrusor contractions referred to as detrusor overactivity. Although involuntary detrusor contractions can be associated with neurologic disorders, they can also occur in individuals who appear to be neurologically normal. When there is no associated neurologic disorder, the urodynamic finding is termed unstable bladder (detrusor instability). When a neurologic deficit exists, the involuntary detrusor contraction is called detrusor hyperreflexia (Abrams, Blaivas, Stanton et al, 1988). A common neurologic disorder associated with detrusor hyperreflexia is stroke. In patients with suprasacral spinal cord lesions and multiple sclerosis, detrusor hyperreflexia is commonly accompanied by external sphincter dyssynergia (inappropriate contraction of the external sphincter), which can cause some degree of urinary retention, vesicoureteric reflux, and renal damage (McGuire, Woodside, Borden et al, 1981).

Urge incontinence may also be a manifestation of involuntary urethral relaxation (urethral instability), which may or may not be associated with involuntary detrusor contraction. The existence of urethral instability as an independent entity, however, is still controversial.

Another urodynamic finding associated with the symptom of urge incontinence in frail elderly patients is detrusor hyperactivity with impaired

Table 1. Common causes of transient urinary incontinence

Potential causes	Comment
Delirium (confusional state)	In the delirious patient, incontinence is usually an associated symptom that will abate with proper diagnosis and treatment of the underlying cause of confusion.
Infection (symptomatic urinary tract infection)	Dysuria and urgency from symptomatic infection may defeat the older person's ability to reach the toilet in time. Asymptomatic infection, although more common than symptomatic infection, is rarely a cause of incontinence.
Atrophic urethritis or vaginitis	Atrophic urethritis or vaginitis may present as dysuria, dyspareunia, burning on urination, urgency, agitation (in demented patients), and occasionally as incontinence. Both disorders are readily treated by conjugated estrogen administered either orally (0.3-1.25 mg/d) or locally (2 g or fraction/d). (*See Chapter 3 section "Pharmacologic Treatment of Incontinence."*)
Pharmaceuticals	
Sedative hypnotics	Benzodiazepines, especially long-acting agents such as flurazepam and diazepam, may accumulate in elderly patients and cause confusion and secondary incontinence. Alcohol, frequently used as a sedative, can cloud the sensorium, impair mobility, and induce a diuresis, resulting in incontinence.
Diuretics	A brisk diuresis induced by loop diuretics can overwhelm bladder capacity and lead to polyuria, frequency, and urgency, thereby precipitating incontinence in a frail older person. The loop diuretics include furosemide, ethacrynic acid, and bumetanide.

bladder contractility (DHIC) (Resnick and Yalla, 1987). Patients with DHIC have involuntary detrusor contractions, yet must strain to empty their bladder either incompletely or completely. Clinically, patients with DHIC generally have symptoms of urge UI with an elevated post-void residual (PVR) volume, but they

Table 1. Common causes of transient urinary incontinence—Continued

Potential causes	Comment
Pharmaceuticals (continued)	
Anticholinergic agents Antihistamines Antidepressants Antipsychotics Disopnamide Opiates Antispasmodics (dicyclomine and Donnatal) Anti-parkinsonian agents (trihexyphenidyl and benztropine mesylate)	Nonprescription (over-the-counter) agents with anticholinergic properties are taken commonly by older patients for insomnia, coryza, pruritus, and vertigo, and many prescription medications also have anticholinergic properties. Anticholinergic side effects include urinary retention with associated urinary frequency and overflow incontinence. Besides anticholinergic actions, antipsychotics such as thioridazine and haloperidol may cause sedation, rigidity, and immobility.
Alpha-adrenergic agents Sympathomimetics (decongestants) Sympatholytics (e.g., prazosin, terazosin, and doxazosin)	Sphincter tone in the proximal urethra can be decreased by alpha antagonists and increased by alpha agonists. An older woman, whose urethra is shortened and weakened with age, may develop stress incontinence when taking an alpha antagonist for hypertension. An older man with prostate enlargement may develop acute urinary retention and overflow incontinence when taking multicomponent "cold" capsules that contain alpha agonists and anticholinergic agents, especially if a nasal decongestant and a nonprescription hypnotic antihistamine are added.
Calcium channel blockers	Calcium channel blockers can reduce smooth muscle contractility in the bladder and occasionally can cause urinary retention and overflow incontinence.

may also have symptoms of obstruction, stress incontinence, or overflow incontinence. Detrusor hyperactivity with impaired bladder contractility is important because it can mimic these other types of UI resulting in inappropriate treatment. It is diagnosed urodynamically.

Table 1. Common causes of transient urinary incontinence—Continued

Potential causes	Comment
Psychological	Severe depression may occasionally be associated with incontinence but is probably less frequently a cause in older patients.
Excessive urine production	Excess intake, endocrine conditions that cloud the sensorium and induce a diuresis (e.g., hypercalcemia, hyperglycemia, and diabetes insipidus), and expanded volume states such as congestive heart failure, lower extremity venous insufficiency, drug-induced ankle edema (e.g., nifedipine, indomethacin) and low albumin states cause polyuria and can lead to incontinence.
Restricted mobility	Limited mobility is an aggravating or precipitating cause of incontinence that can frequently be corrected or improved by treating the underlying condition (e.g., arthritis, poor eyesight, Parkinson's disease, or orthostatic hypotension). A urinal or bedside commode and scheduled toileting often help resolve the incontinence that results from hospitalization and its environmental barriers (e.g., bed rails, restraints, and poor lighting).
Stool impaction	Patients with stool impaction present with either urge or overflow incontinence and may have fecal incontinence as well. Disimpaction restores continence.

Stress Incontinence

Another distinct presentation of UI is stress incontinence, the involuntary loss of urine during coughing, sneezing, laughing, or other physical activities that increase abdominal pressure. This symptom may be confirmed by observing urine loss coincident with an increase in abdominal pressure, in the absence of a detrusor contraction or an overdistended bladder (International Continence Society, 1990). The most common cause is hypermobility or significant displacement of the urethra and bladder neck during exertion.

Another cause of stress UI is intrinsic urethral sphincter deficiency (ISD), which may be due to congenital sphincter weakness such as myelomeningocele or

epispadias or may be acquired after prostatectomy, trauma, radiation, or sacral cord lesion. In women, ISD is commonly associated with multiple anti-incontinence procedures. In this condition, the urethral sphincter is unable to coapt and generate enough resistance to retain urine in the bladder, especially during stress maneuvers (Blaivas, 1985; Staskin, Zimmer, Hadley et al, 1985). Patients with ISD often leak continuously or with minimal exertion.

Overflow Incontinence

Involuntary loss of urine associated with overdistension of the bladder is termed overflow incontinence. This type of incontinence may have a variety of presentations, including frequent or constant dribbling, or have urge or stress incontinence symptoms. Overflow UI may be due to and underactive or acontractile detrusor or to bladder outlet or urethral obstruction leading to overdistension and overflow. The bladder may be underactive or acontractile secondary to drugs, fecal impaction, or neurologic conditions such as diabetic neuropathy or low spinal cord injury or following radical pelvic surgery. Vitamin B_{12} deficiency is also a potential cause of bladder weakness, although to date there is no evidence reporting such association. The detrusor muscle may also be weak from idiopathic causes.

In men, overflow incontinence associated with obstruction is commonly due to prostatic hyperplasia and less frequently to prostatic carcinoma or urethral stricture. Outlet obstruction is rare in women. However, it can occur as a complication of an anti-incontinence operation. Other causes of obstruction in women are severe pelvic prolapse in which the organ involved protrudes to or beyond the vaginal orifice (prolapsing cystocele, uterine prolapse, etc.) and, in suprasacral spinal cord-injured and multiple sclerosis patients, detrusor external sphincter dyssynergia (DSD) in which the sphincter muscle inappropriately and involuntarily contracts rather than relaxes when the detrusor contracts (Blaivas, 1985).

Other Causes and Types of Incontinence

Urine loss may be caused by factors outside the lower urinary tract such as chronic impairments of physical and/or cognitive functioning, a condition commonly termed functional incontinence (Williams and Pannill, 1982). This type of diagnosis should, however, be one of exclusion. Many immobile and cognitively impaired incontinent patients have other types and causes of UI that may respond to specific therapies. In addition, UI can often be improved or cured simply by improving the patient's functional status, treating other medical

conditions, discontinuing certain types of medication, adjusting the hydration status, and/or reducing environmental barriers—even if a lower urinary tract abnormality is present (see causes of transient UI in Table 1).

It is not unusual for patients to present with a combination of urge and stress incontinence (Ouslander, Hepps, Raz et al, 1986; Fantl, Wyman, McClish et al, 1990). When both presentations are present, the incontinence is called mixed UI. Many frail elderly patients have components of both urge and functional UI (Ouslander, Leach, Staskin et al, 1989; Resnick, Yalla, and Laurino, 1989). Identifying combined types of UI is an important factor in determining the most appropriate therapy.

Urine loss may occur in the absence of any warning or sensory awareness as experienced by paraplegics and some patients without overt neurologic dysfunction. Other presentations of UI include dribbling, which may be described as either postmicturitional or constant (continuous) dribbling. Nocturnal enuresis is UI that occurs during sleep. At times, characterizations of incontinence may be difficult or incontinence may occur only in unusual circumstances.

Another urodynamic finding that may be associated with UI is decreased bladder compliance. This abnormal bladder condition may result from radiation cystitis, inflammatory bladder conditions such as chemical cystitis or interstitial cystitis, and some neurologic bladder disorders, such as those that occur following radical pelvic surgery and in myelomeningocele. Many of the patients with a nonneurogenic etiology for their decreased bladder compliance (chemical cystitis, radiation cystitis, etc.) have severe urgency associated with bladder hypersensitivity and with no demonstrable detrusor overactivity. This is termed sensory urgency. Loss of bladder wall elasticity and lack of bladder accommodation produce a steep rise in intravesical pressure during bladder filling without detrusor contraction. In patients in whom the urethral sphincter mechanism may already be compromised by the condition that produced the inelastic bladder (radiation, neurologic dysfunction, etc.), the abnormal increase in bladder pressure may overcome the urethral pressure and produce UI. A major concern in patients with a poorly compliant bladder, especially in those who are neurologically impaired, is the development of vesicoureteric reflux and hydronephrosis.

2 Identifying and Evaluating Urinary Incontinence: Recommendations in Clinical Practice

Patients complaining of UI that is sufficient to be a problem should be evaluated. Because most people with UI do not seek professional help (Herzog, Fultz, Normolle et al, 1989), it is recommended that primary health care professionals question their patients regularly to identify UI. Open-ended questions, such as, "Do you have trouble with your bladder?" and "Do you have trouble holding your urine (water)?" are a useful initial approach. These should be followed by specific questions, such as, "Do you ever lose urine when you don't want to?" and "Do you ever wear a pad or other protective device to collect your urine?"

If UI is identified by questioning, detection of an odor, visualization of wetness, or patient complaint and represents a problem for the patient (or caregiver), evaluation should be undertaken as described below.

General Principles of Diagnostic Evaluation

All incontinent patients needing evaluation should receive a basic evaluation from a knowledgeable health care professional. Although most of the evaluations are presently being undertaken by professionals such as gynecologists, urologists, geriatricians, physiatrists, and nurse specialists and practitioners, the panel is encouraging other primary health care providers such as family practitioners, general internists, and physician assistants to be knowledgeable of and able to initiate the basic assessments of UI.

Basic Evaluation

Purpose

Urinary incontinence is a symptom and not a condition in itself. Thus, the purposes of the basic evaluation are to:

- Confirm UI objectively;
- Identify factors that may be contributing to, or resulting from, the UI; and
- Identify patients who require further evaluation before any therapeutic interventions are attempted or patients who may receive initial treatment without further testing.

Components

The basic evaluation should include the following components:

- History
- Physical examination with additional tests
- Urinalysis.

In specific cases, simple tests of the lower urinary tract function may also be required.

History. A history is required in a basic evaluation of all incontinent patients: (1) a focused medical, neurologic, and genitourinary history and medication review, including nonprescription medications, and (2) a detailed exploration of the symptoms of UI and associated symptoms and factors.

- Duration and characteristics of UI (stress, urge, dribbling, others)
- Frequency, timing, and amount of continent and incontinent voids
- Precipitants and associated symptoms of incontinence (e.g., situational antecedents, cough, surgery, injury, trauma, new onset of diseases, and new medications)
- Other lower urinary tract symptoms (such as nocturia, dysuria, hesitancy, poor or interrupted stream, straining, hematuria, suprapubic or perineal pain, frequency, urgency, or increased leakage)
- Fluid intake pattern, including caffeine-containing or other diuretic fluids
- Alterations in bowel habit or sexual function
- Previous treatment and its effects on UI
- Use of pads, briefs, or other protective devices.

Physical examination. The physical examination is a basic evaluation required for all incontinent patients. It includes:

- Abdominal examination to detect masses, suprapubic fullness or tenderness, and estimation of PVR urine.
- Genital examination in men to detect abnormalities of the foreskin, glans penis, and perineal skin.

- Pelvic examination in women to assess perineal skin condition, genital atrophy, pelvic prolapse (cystocele, rectocele, uterine prolapse), pelvic mass, perivaginal muscle tone, or other abnormality and to estimate PVR urine (bimanual) (Brink, Sampsell, Wells et al, 1989). In addition, palpation of the anterior vaginal wall and urethra may elicit urethral discharge or tenderness that may suggest a urethral diverticulum. Pelvic muscle relaxation may not relate to urinary symptoms, especially in the elderly (Ouslander, Hepps, Raz et al, 1986). Assessments of the urethra and bladder neck hypermobility, vaginal wall pliability and compliance, and vaginal capacity are helpful when the patient's potential for surgical therapy is being determined. Hypermobility is assessed during pelvic examination by observing the posterior rotational descent of the proximal urethra and bladder neck when the patient is asked to strain or cough while a posterior speculum is retracting or depressing the posterior vaginal wall.

- Rectal examination to test for perineal sensation, sphincter tone (both resting and active), bulbocavernosus reflex, fecal impaction, rectal mass, and estimation of PVR urine (bimanual) and to evaluate the consistency and contour of the prostate in males. The size of the prostate on digital examination does not exclude or imply obstruction and is usually helpful only for the surgeon in determining the surgical approach if operation is being contemplated.

- General examination if indicated to detect conditions such as edema that may contribute to nocturia and nocturnal UI; to detect neurologic abnormalities (optic disc, visual field, or reflex abnormalities) that may suggest multiple sclerosis, stroke, or other neurologic conditions; and to assess mobility, cognition, and manual dexterity if functional UI is suspected (Williams and Gaylord, 1990).

Additional tests. Following the history, physical examination, and urinalysis, simple tests of lower urinary tract function may also be required in specific cases. Several such tests can be performed to help clarify some patients' symptoms, identify certain abnormalities, and guide initial therapy. To be useful, these tests must be performed properly and interpreted correctly (Ouslander, Leach, Staskin et al, 1989). They include:

- Estimation of PVR volume
- Provocative stress testing.

Estimation of PVR volume. This test is recommended for all patients with UI. Estimation can be made by abdominal palpation and percussion and/or on bimanual examination. When specific measurement of PVR is needed, it can be accomplished either by catheterization or by pelvic ultrasound (Haylen, 1989; Haylen, Frazer, and MacDonald, 1989; Ireton, Krieger, Cardenas et al, 1990).

Some panel members believe that accurate measurement of PVR volume should be obtained on most patients whereas others do not. Because of this difference in opinion and lack of specific information on this subject, further research is recommended. Measurement of PVR volume is generally done within a few minutes after voiding by catheterizing the patient or assessing by pelvic ultrasound. Review of the literature failed to show a specific maximum PVR volume that is considered normal, nor is there any documentation of the minimal PVR that is considered abnormal. It is the consensus of the panel members that, in general, a PVR less than 50 mL is considered adequate bladder emptying and over 200 mL is considered inadequate emptying. Since PVR volume may vary, one measurement of PVR may not be sufficient. Clinical judgment must be exercised and all other clinical information be included in interpreting the significance of PVR volume, especially in the intermediate range of 50-199 mL. The PVR urine may be influenced by such factors as the volume voided prior to PVR measurement, whether the patient is "ready" to void or strains to void, and the environment or clinical setting.

Catheterization for measuring the PVR volume, especially in the male patient, should be performed only by experienced clinicians to avoid complications related to instrumentation. Specifically in men with prostate obstruction, a single catheterization may be sufficient to cause urinary infection. Therefore, catheterization in men should be performed only with clear indication and by a clinician who is prepared to manage abnormal findings. An alternative to catheterization is the use of pelvic ultrasound.

Provocative stress testing. If stress UI is suspected, provocative stress testing (direct visualization) can be performed by having the individual relax and then cough vigorously while the examiner observes for urine loss from the urethra. Optimally, these tests should be done when the patient's bladder is full, but they should not be performed when the patient has a precipitant urge to void (Kadar, 1988). They can be done in the standing or lithotomy position. If an instantaneous leakage occurs with cough, then stress UI is likely; if leakage is delayed or persists after the cough, detrusor overactivity should be suspected. If the test is initially performed in the lithotomy position and no leakage is observed, the test should be repeated in the standing position, since the yield is increased when the test is repeated in the upright position (Kadar, 1988). If bladder filling is needed to

perform stress testing, this may be conveniently performed in conjunction with the catheterization being done for PVR volume measurement.

Urinalysis. This is a basic test required for UI to detect associated or contributing conditions such as hematuria (suggestive of infection, cancer, or stone), pyuria, and bacteriuria, as well as glycosuria and proteinuria. Dipstick (enzymatic) testing of urine is an acceptable screening technique of urinalysis. Microscopic evaluation of the urinary sediment may also be used during the initial assessment.

If bacteria and/or white blood cells are present in a properly obtained urine sample, a specimen may be sent for culture. Although the relationship between "asymptomatic" bacteriuria and UI has not been fully determined in nursing home populations, no correlation has been found linking asymptomatic bacteriuria with UI among noninstitutionalized persons (Boscia, Kabasa, Levison et al, 1986). Further research is needed to clarify this relationship. Until such data are available, infection should be treated when the incontinent patient is initially evaluated and the effect observed before further diagnostic or therapeutic interventions are undertaken (Ouslander, 1989).

Supplementary assessments that may be helpful in the basic evaluation of the incontinent patient include:

- Use of a voiding record
- Evaluation of environmental and social factors
- Observation of voiding
- Blood tests
- Urine cytology.

Use of a "voiding record" (diary), also called an "incontinence monitoring record" or "bladder record." These written records may be used to determine the frequency, timing, amount of voiding, and other factors associated with UI. These records can be kept by the patient or a caregiver for a few days prior to the basic evaluation. Such a record may provide clues as to the underlying cause of UI and can serve as a baseline to gauge severity and treatment efficacy (see sample voiding records, Figures 2 and 3) (Diokno, Wells, and Brink, 1987; Wyman, Choi, Harkins et al, 1988; Ouslander, Hepps, Raz et al, 1986).

Evaluation of environmental and social factors. With frail or functionally impaired individuals, especially the elderly, environmental and social factors must be considered. Environmental factors include access to toilets or toilet substitutes. Social factors include living arrangements, social contacts, or caregiver involvement (Williams and Gaylord, 1990).

Figure 2. Incontinence monitoring record for hospital and nursing home patients

INSTRUCTIONS: EACH TIME THE PATIENT IS CHECKED:
1) Mark one of the circles in the BLADDER section at the hour closest to the time the patient is checked.
2) Make an X in the BOWEL section if the patient has had an incontinent or normal bowel movement.

● = Incontinent, small amount Ø = Dry X = Incontinence BOWEL
● = Incontinent, large amount △ = Voided correctly X = Normal BOWEL

PATIENT NAME _____ ROOM # _____ DATE _____

	BLADDER			BOWEL			
	INCONTINENCE OF URINE	DRY	VOIDED CORRECTLY	INCONTINENCE X	NORMAL X	INITIALS	COMMENTS
12 am	● ●	O	△ cc				
1	● ●	O	△ cc				
2	● ●	O	△ cc				
3	● ●	O	△ cc				
4	● ●	O	△ cc				
5	● ●	O	△ cc				
6	● ●	O	△ cc				
7	● ●	O	△ cc				
8	● ●	O	△ cc				
9	● ●	O	△ cc				
10	● ●	O	△ cc				
11	● ●	O	△ cc				
12 pm	● ●	O	△ cc				
1	● ●	O	△ cc				
2	● ●	O	△ cc				
3	● ●	O	△ cc				
4	● ●	O	△ cc				
5	● ●	O	△ cc				
6	● ●	O	△ cc				
7	● ●	O	△ cc				
8	● ●	O	△ cc				
9	● ●	O	△ cc				
10	● ●	O	△ cc				
11	● ●	O	△ cc				

TOTALS:

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Figure 3. Bladder record for office or clinic patients

PATIENT NAME _____ DATE _____

INSTRUCTIONS

Column 1 – Place a check next to the time urinated.

Column 2 – Place a check next to the time an incontinent episode occurred. Note if the episode was large or small.

Column 3 – Place a check next to the time WET PADS were changed.

Column 4 – Note the activity that may be associated with the incontinence, like sneezing, coughing, lifting something heavy, "couldn't make it to the bathroom," "did not know I had to go."

	Column 1	Column 2	Column 3	Column 4
Time interval	Urinated in toilet	Had an incontinent episode	Changed wet pad	Activity associated with incontinent episodes
6-8 am				
8-10 am				
10-noon				
2-4 pm				
4-6 pm				
6-8 pm				
8-10 pm				
10-midnight				
Overnight				

Comments _____

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Observation of voiding. This is done to detect signs of hesitancy or straining and slow or interrupted stream and is especially useful if urethral obstruction or a bladder emptying problem is suspected. Determining the ability to interrupt the urinary stream is also useful if pelvic muscle exercises will be prescribed.

Blood tests. Tests should be done for blood urea nitrogen (BUN) and creatinine levels in patients suspected of having obstruction or noncompliant bladders and in those with urinary retention. However, normal BUN and creatinine levels do not rule out hydronephrosis (see also the discussion on benign prostatic hyperplasia, pp. 49-50).

Patients with polyuria in the absence of diuretic agents should be evaluated for excess intake, hyperglycemia, and hypercalcemia if indicated.

Urine cytology. Urine cytology should be done to screen for malignancy in patients with hematuria or the recent onset of irritative voiding symptoms in the absence of UTI (Utz and Zincke, 1974). Complete evaluation of hematuria is not the purview of this guideline. Following the basic evaluation, all incontinent patients in whom transient (reversible) causes of UI (Table 1) have been detected should be managed appropriately. If UI persists after the transient causes are identified and managed, further evaluation may be helpful before therapy is initiated. Patients who may not need such testing are those with simple stress UI, those with urge UI with low PVR volume and no complicating features, and women with mixed urge/stress UI with normal PVR volume for whom behavioral and/or pharmacologic therapy is preferred. Patients requiring further evaluation include those who meet one of the following criteria:

- Uncertain diagnosis and inability to develop a reasonable management plan based on the basic diagnostic evaluation. Uncertainty in diagnosis may occur for a patient where there is lack of correlation between symptomatology and clinical findings.
- Failure to respond to an adequate therapeutic trial and thus a candidate for further therapy.
- Hematuria without infection.
- The presence of other comorbid conditions, such as incontinence associated with recurrent symptomatic UTIs, severe symptoms of difficult bladder emptying, severe and symptomatic pelvic prolapse, prostate nodule, abnormal PVR urine, and neurologic condition, except for patients for whom further investigation is not feasible.

Further Evaluation by Qualified Specialists

The objectives of further evaluation are to:

- Identify the specific cause or causes of UI with reproduction of leakage during testing;
- Identify conditions that cause similar symptoms but require different treatments such as outlet obstruction, detrusor muscle weakness, urethral hypermobility, intrinsic urethral sphincter defect, and urethral diverticulum;
- Detect functional, neurologic, or anatomic lesions affecting the lower urinary tract;
- Help obtain specific information necessary for choosing the appropriate therapy; and
- Identify risk factors that may influence the outcome of a specific treatment.

Specialized Tests

Numerous specialized diagnostic tests are available, and the evaluation must be tailored to the question to be answered. Specialized tests include the following:

- Urodynamic tests
- Endoscopic tests
- Imaging tests
  —Upper tract
  —Lower tract with and without voiding.

Urodynamic tests. These tests are designed to determine the anatomic and functional status of the urinary bladder and urethra.

Uroflowmetry measures the urine flow rate visually, electronically, or with the use of a disposable unit. An electronically generated flow curve is considered helpful in identifying abnormal voiding patterns. Uroflowmetry is not helpful in diagnosing the types of incontinence in women (Fantl, Smith, Schneider et al, 1983; Diokno, Normolle, Brown et al, 1990), but it may be helpful in patients with symptoms of bladder emptying difficulty. However, it cannot distinguish between obstruction and detrusor weakness.

Cystometry is a test of detrusor function. Depending on the technique used, cystometry can assess bladder sensation, capacity, and compliance, and it can determine the presence and magnitude of both voluntary and involuntary detrusor contractions. It is important to reproduce the patient's symptoms at the time of cystometry, since involuntary detrusor contractions may be observed in asymptomatic patients. On the other hand, cystometry may be falsely negative in a patient with a genuinely overactive bladder because of psychological inhibition of reflex activity or lack of measurable increase of detrusor pressure, which may be dissipated by poor urethral resistance and therefore must be examined closely.

Simple cystometry is performed by filling the bladder via a urethral catheter to capacity or until an involuntary detrusor contraction occurs. Since a rectal or vaginal catheter is not used to monitor the abdominal pressure, results must be interpreted with caution, especially in uncooperative or demented patients (Ouslander, Leach, Abelson et al, 1988; Ouslander, Leach, and Staskin, 1989).

A filling cystometrogram (CMG) with simultaneous measurement of intra-abdominal pressure is a more accurate technique, since it will differentiate an involuntary detrusor contraction from an increase of intra-abdominal pressure.

A voiding CMG or pressure flow study can measure detrusor contractility and detect outlet obstruction if the patient is able to void. Another use of a filling CMG is to determine "leak point pressure" in patients with stress UI; intravesical pressure is measured at the moment of fluid leakage during straining or Valsalva maneuver.

Urethral pressure profilometry (UPP) measures resting and dynamic pressures in the urethra. Passive measurement of urethral pressures have been used by some investigators to help identify ISD, especially in women who have had previous operations. However, no specific measurement to date has been found to be discriminatory, especially in the elderly because of the normal decline of urethral pressures with age (Diokno, Normolle, Brown et al, 1990). Dynamic measurements of urethral and bladder pressures may be used to measure the effect of exertion on the urethral closure mechanism.

Videourodynamics is a technique that combines the various urodynamic tests with simultaneous fluoroscopy. It is helpful in sorting out causes of complex incontinence problems and can identify detrusor overactivity, detrusor sphincter dyssynergia, intrinsic urethral defects, outlet obstruction, and detrusor contractility problems including DHIC.

Electromyography (EMG) of the striated urethral sphincter measures the integrity and function of its innervation. Both needle and surface EMG, in conjunction with CMG, are helpful in diagnosing detrusor sphincter dyssynergia (Diokno, Koff, and Anderson, 1976; Blaivas, 1990). However, DSD should be

diagnosed only after common artifacts such as volitional tightening of the sphincter during involuntary detrusor contraction are excluded.

Endoscopic test

Cystourethroscopy. This procedure may help in identifying bladder lesions and foreign bodies, as well as urethral diverticula, fistula, strictures, or ISD. Since this test is not performed during voiding, its usefulness in corroborating or excluding outlet obstruction is limited. However, it is useful in identifying the site of obstruction once obstruction has been confirmed by other tests.

Imaging tests

Upper tract imaging is not a routine test to evaluate UI. Ultrasound of the kidneys and/or bladder can help identify dilation of the upper urinary tract and renal pathology, especially in patients with urinary retention, abnormal renal function, or poorly compliant bladders. Excretory urography or other imaging modalities are indicated for patients with hematuria or for further evaluation of upper tract obstruction or other pathology identified by ultrasound (Kumar and Schriever, 1985).

Lower tract imaging with and without voiding is helpful in examining the anatomy of the urinary bladder and urethra. Nonvoiding lateral cystourethrography in the resting and straining view can identify mobility or fixation of the bladder neck, funneling of the bladder neck and proximal urethra, and degree of cystocele. The voiding component can identify a urethral diverticulum, obstruction, and vesicoureteral reflux. Ultrasonography for assessing the dynamics of the bladder neck and urethra is still under investigation, and its clinical utility remains to be confirmed (Bhatia, Ostergard, and McQuown, 1987; Benson and Sumners, 1990; Quinn, Beynon, Mortensen et al, 1988; Richmond and Sutherst, 1989).

Table 2 is a guideline summary of the major symptoms of incontinence, associated factors, conditions, and diagnostic test options recommended for basic and further evaluation of UI.

Table 2. Diagnostic test options according to symptoms, conditions, and associated factors*

Symptom	Condition	Associated factors	Diagnostic test options
Urge	Unstable bladder or detrusor instability	No neurologic deficit	Filling or simple CMG
	Detrusor hyperreflexia, detrusor sphincter dyssynergia	With neurologic lesion such as stroke, supra-spinal cord lesion, multiple sclerosis	Filling or simple CMG, CMG-EMG
	Detrusor hyperactivity with impaired contractility	Elderly, usually also associated with obstructive or stress symptoms	Voiding CMG, videourodynamics
	Urethral instability (see text)	With or without neurologic deficit	Filling CMG-EMG, filling CMG-UPP, videourodynamics
Stress	Hypermobility of bladder neck (female)	Pelvic muscle relaxation	Stress test (direct visualization) Stress cystourethrogram Dynamic profilometry or leak point pressure Videourodynamics Cystourethroscopy
	Intrinsic sphincter deficiency	Nonneurogenic, traumatic, postoperative (after prostatectomy or anti-incontinence surgery), congenital (epispadias)	Same as above
	Neurogenic sphincter deficiency	Neurogenic, sacral, or infrasacral lesion (myelomeningocele)	Same as above EMG

Table 2. Diagnostic test options according to symptoms, conditions, and associated factors—Continued

Symptom	Condition	Associated factors	Diagnostic test options
Overflow	Overflow from underactive or acontractile detrusor	Male: prostate gland disease, urethral stricture, neurogenic (low spinal cord lesion, neuropathy, postradical pelvic surgery), idiopathic detrusor failure	PVR volume Uroflowmetry Voiding CMG (pressure flow) Cystourethroscopy
	Overflow from outlet obstruction (female)	Female: anti-incontinence surgery, severe pelvic prolapse	Same as above Stress cystourethrogram Videourodynamics

*The diagnostic tests listed here are not recommended for routine use but are options that must be exercised according to the question to be answered. For details on the various tests, see text.
CMG = cystometrogram, EMG = electromyogram, PVR = post-void residual volume, UPP = urethral pressure profilometry.

3 Treatment of Urinary Incontinence

The three major categories of treatment are:

- Behavioral
- Pharmacologic
- Surgical.

Treatment options including their risks, benefits, and outcomes should be discussed with the patient so that informed choices can be made. As a general rule, the least invasive and least dangerous procedure that is appropriate for the patient should be the first choice. For many forms of UI, behavioral techniques meet these criteria. However, an informed patient's preference must be respected. A combination of surgical, behavioral, and/or pharmacologic interventions may help, but more research is required to determine the optimum treatment combinations in specific patient groups.

Behavioral Techniques

Behavioral techniques are low-risk interventions that decrease the frequency of UI in most individuals when provided by knowledgeable health care professionals.

Behavioral techniques include:

- Bladder training (retraining)
- Habit training (timed voiding)
- Prompted voiding
- Pelvic muscle exercises.

Additional techniques that may be used in conjunction with these behavioral methods include:

- Biofeedback
- Vaginal cone retention
- Electrical stimulation.

All behavioral techniques involve educating the patient and providing positive reinforcement for effort and progress. These techniques should be offered to cooperative individuals who wish to avoid dependence on protective garments,

external devices, medications, and/or more invasive procedures. Behavioral techniques have no reported side effects and do not limit future options. Behavioral techniques can increase patient understanding of lower urinary tract function and the environmental factors affecting symptoms. These techniques can improve control of detrusor and pelvic muscle function. They require personal (and caregiver) involvement and continued practice. If motivated, most people treated with behavioral techniques show improvement ranging from complete dryness to important reductions of wetness. Improved bladder control can even occur in the cognitively impaired individual (Schnelle, 1990; Engel, Burgio, McCormick et al, 1990; McCormick, Scheve, and Leahy, 1988). Behavioral techniques can be used in combination with other therapies for UI.

Published results indicate that determining the effectiveness of behavioral interventions is hampered by several limitations. These include:

- Use of different outcome criteria
- Variability in number and frequency of treatment sessions
- Variability of comprehensiveness in training procedures
- Absence or variability in followup data
- Concurrent application of multiple interventions which confound outcomes
- Unspecified criteria for group assignment
- Use of heterogeneous samples
- Uncontrolled inclusion of subjects who had failed previous incontinence treatments
- Lack of standardized terminology for the various behavioral techniques. (Because of the lack of standardized terminology, the reader must examine each study carefully and be alert to differences even in studies that appear to use the same terms.)

However, in general, studies show that behavioral interventions are effective in reducing incontinence.

Assessments Before Behavioral Intervention

Before implementing behavioral therapy, patients should undergo the basic evaluation. Behavioral approaches are tailored to the patient's underlying problem, such as bladder or habit training for urge UI and pelvic muscle exercises for stress UI. Patients with overflow UI are not primary candidates for behavioral intervention.

Bladder Training

Bladder training (also termed bladder retraining) has many variations but generally consists of three primary components:

- Education
- Scheduled voiding
- Positive reinforcement.

The education program usually combines a written, visual, and verbal instruction package that addresses the physiology and pathophysiology of the lower urinary tract. The voiding schedule incorporates a progressively increased interval between mandatory voidings with concomitant distraction or relaxation techniques. The person is taught to delay voiding consciously. If the patient is unable to delay voiding between schedules, one approach is to adjust this schedule and start the timing from the last void. Another option is to keep the prearranged schedule and disregard the unscheduled void between schedules. Positive reinforcement is provided. At this time, no urodynamic variable has been shown to relate directly to the observed beneficial clinical effects.

A bladder retraining program requires the participant to resist or inhibit the sensation of urgency, to postpone voiding, and to urinate according to a timetable rather than according to the urge to void (McCormick and Burgio, 1984). Bladder training may involve tactics that help distend the bladder, such as adjustment in fluid loads and delayed voiding to provide progressively larger voiding volumes and longer intervals between voids (Keating, Schulte, and Miller, 1988). Initially, the interval goal is usually set between 2 and 3 hours, although the voiding schedule is usually not enforced during sleeping hours. The treatment may continue for several months, with scheduled health care contacts during which the therapist provides reinforcement and instruction. A recent randomized controlled study (Fantl, Wyman, McClish et al, 1991) reported that 12 percent of the women who underwent bladder training became continent and 75 percent improved by at least a 50 percent reduction in the number of incontinent episodes.

This form of training has been used to manage UI due to bladder instability. However, recent observations indicate that this training may also control stress incontinence, and therefore, can be used in its management (Burgio, Whitehead, and Engel, 1985; Burton, Pearce, Burgio et al, 1988; Ferrie, Smith, Logan et al, 1984; Klarskov, Gerstenberg, and Hald, 1986; Oldenburg and Millard, 1986; Pengelly and Booth, 1980; Fantl, Wyman, Harkins et al, 1990; Rose, Baigis-Smith, Smith et al, 1990; Baigis-Smith, Smith, Rose et al, 1989).

Habit Training

Habit training or timed voiding is scheduled toileting on a planned basis. The goal is to keep the person dry by telling them to void at regular intervals. Attempts are made to match the voiding intervals to the person's natural voiding schedule. Unlike bladder retraining, there is no systematic effort to motivate the patient to delay voiding and resist urge. Studies indicate improvement in some patients (Hu, Igou, Kaltreider et al, 1989; Schnelle, Newman, and Fogarty, 1990; Colling, Ouslander, Hadley et al, 1991; Engel, Burgio, McCormick et al, 1990).

In the one controlled study on habit training, the individual voiding patterns of 51 residents were identified with an electronic monitoring device (Jarvis, 1981). Nursing home staff were taught to toilet subjects during periods of highest voiding probability, which was based on individual voiding patterns determined from 72 hours of monitoring. Results showed that the frequency of UI among 51 experimental subjects was significantly decreased during the 3-month intervention in 86 percent of the subjects, with one-third of this group showing 25 percent or greater improvement over their baseline UI levels. In the control group, the frequency of UI increased slightly during the same period of time. The volume of urine loss during the incontinence episodes decreased significantly in the experimental group when compared with baseline levels. No such decrease occurred in the control group. There are no reported side effects of habit training for nursing home residents. Nursing staff compliance, however, was cited as a problem because of resistance to changes in their routines of care.

Prompted Voiding

Prompted voiding has been shown to be effective in dependent or cognitively impaired nursing home incontinent patients (Schnelle, 1990; Hu, Igou, Kaltreider et al, 1989; Engel, Burgio, McCormick et al, 1990; McCormick, Scheve, and Leahy, 1988). As a supplement to habit training, prompted voiding attempts to teach the incontinent person to discriminate their incontinence status and to request toileting assistance from caregivers. There are three major elements to prompted voiding:

- *Monitoring*. The person is checked by caregivers on a regular basis and asked to report verbally if wet or dry.
- *Prompting*. The person is asked (prompted) to try to use the toilet.
- *Praising*. The person is praised for maintaining continence and for attempting to toilet.

Three clinical trials, two controlled (Hu, Igou, Kaltreider et al, 1989; Schnelle, 1990) and one uncontrolled (Engel, Burgio, McCormick et al, 1990), have evaluated prompted voiding in nursing homes. The combined trials worked with 210 intervention group residents and documented significant reductions in incontinence frequency with no reported side effects. An average reduction of 1.0-2.2 incontinence episodes per patient per day was reported. Control group subjects were incontinent approximately 4.5 times per 12-hour period and did not change or worsen over the clinical trial periods. The assessment procedures to identify those nursing home residents most responsive to prompted voiding also were identified. Residents with lower voiding frequencies (less than four in a 12-hour period) and residents who appropriately toilet over 75 percent of the time during a brief 2- to 6-day prompted voiding trial are most likely to show long-term benefits with prompted voiding. A recent clinical trial in seven nursing homes (Colling, Ouslander, Holling et al, 1991) reported that nursing staff were able to maintain improved resident continence levels for 6 months with 76 residents who were identified as highly responsive to prompted voiding.

Pelvic Muscle Exercises

Pelvic muscle exercises, also called Kegel exercises, improve urethral resistance through active exercise of the pubococcygeus muscle. The exercises strengthen the voluntary periurethral and pelvic muscles. The contraction exerts a closing force on the urethra and increases muscle support to the pelvic visceral structures.

The first step in pelvic muscle re-education is to establish better awareness of pelvic muscle function. These exercises can be performed by "drawing in" the perivaginal muscles and anal sphincter as if to control urination or defecation but without contracting abdominal, buttock, or inner thigh muscles (Rose, Baigis-Smith, Smith et al, 1990). Health care providers must teach patients the correct method of contracting and discriminating the muscle with palpation and verbal feedback to assure accurate performance (Dougherty, Abrams, and McKey, 1986; Benvenuti, Caputo, Bandinelli et al, 1987; Burns, Marecki, Dittmar et al, 1985; Keating, Schulte, and Miller, 1988). The specific effects of pelvic muscle exercise on actual muscle function are not known, nor is it known to what degree of accuracy pelvic muscle contraction can be detected via palpation. Emphasis is placed on sustaining contractions for a period of up to 10 seconds followed by an equal period of relaxation. Individuals are given written instructions to follow. These exercises should be performed about 30-80 times a day for at least 6 weeks and may need to be continued indefinitely. Elderly patients may require a longer time to train. In general, an individualized program should be established after

careful training by an experienced clinician (Ferguson, McKey, Bishop et al, 1990).

Home training and monitoring devices are available, but their benefit is controversial and has not been demonstrated in well-designed clinical trials. However, biofeedback of performance appears to be useful in teaching pelvic muscle exercise because it reinforces the patient's ability to discriminate muscle contraction, but how often and in whom it is actually required are currently unknown (Burns, Pranikoff, Nochajski et al, 1990).

Pelvic muscle exercises are indicated for women with stress incontinence (Castleden, Duffin, Asher et al, 1985; Klarskov, Gerstenberg, and Hald, 1986). However, they can be effective in reducing incontinence following prostatic surgery in men (Burgio, Stutzman, and Engel, 1989), after multiple surgical repairs in women (Brink, Wells, and Diokno, 1983; Ferguson, McKey, Bishop et al, 1990; Heller, Whitehead, and Johnson, 1989; Henalla, Kirwan, Castleden et al, 1988; Middaugh, Whitehead, Burgio et al, 1989; Pearson and Droessler, 1988; Baigis-Smith, Smith, Rose et al, 1989; Stoddart, 1983; Burgio and Engel, 1990; Castleden, Duffin, and Mitchell, 1984; Rose, Baigis-Smith, Smith et al, 1990), and even in patients with urge incontinence. Study results vary because of inconsistent teaching methods and the level of patient motivation. It is important to teach persons to use these exercises prior to and during situations when leakage may occur. Results of pelvic muscle exercises alone indicate that many patients report improvement or complete continence. A recent randomized controlled trial (Burns, Pranikoff, Nochajski et al, 1990) among elderly women reported a 16 percent cure rate and a 54 percent improvement rate. Another recent randomized but uncontrolled trial (Wells, Rink, Diokno et al, 1991) reported a cure/improved rate of 77 percent, an outcome comparable with the other arm of this study using phenylpropanolamine (PPA), which produced an 84 percent improvement rate.

Vaginal Cones

The use of vaginal cones may serve as an adjunct to pelvic muscle training in women. The patient receives a set of cones that are of identical shape and volume but of increasing weight. As part of a structured exercise program, women insert the weighted cone intravaginally with the tapered portion resting on the superior surface of the perineal muscle and attempt to retain it by contracting the pelvic muscles for up to 15 minutes. This is done twice daily. The sustained contraction required to retain the cone increases the strength of the pelvic muscles, and the weight of the cone is assumed to provide heightened proprioceptive feedback to desired pelvic muscle contraction.

Initial observations from three studies totaling 103 females indicate subjective cure or greatly improved status from 68 to 79 percent with 4-6 weeks of treatment (Peattie, Plevnik, and Stanton, 1988; Olah, Bridges, Denning et al, 1990; Wilson, Al Samarrai, Deakin et al, 1987). Objective outcomes include reduction of urine loss on pad test with minimal or no adverse reactions. However, the reports include observations made only on premenopausal women with stress incontinence. While weighted vaginal cones may be useful in the treatment of incontinence, issues of applicability to other populations, particularly postmenopausal women with vaginal atrophy or other comorbid conditions, must be evaluated in terms of treatment protocols and long-term effects.

Biofeedback

Biofeedback, used in conjunction with other behavioral treatment techniques, can be useful in the reduction of symptoms associated with UI.

Biofeedback uses electronic or mechanical instruments to relay information to patients about their physiologic activity. It aims to alter bladder dysfunction by teaching people to change physiologic responses that mediate bladder control (Burgio and Engel, 1990). Display of this information, through auditory or visual displays, forms the core of biofeedback procedures (Schwartz, 1987).

Measures used for biofeedback include EMG and manometric indices of pelvic and abdominal muscle activity and manometric measures of detrusor activity. Biofeedback should be used in conjunction with other behavioral techniques. Successful application of biofeedback is highly dependent on the knowledge and skill of the health care provider. Their knowledge must be comprehensive and include familiarity with evaluation techniques, anatomic and physiologic correlates of the different forms and symptoms of bladder dysfunction, instrumentation, and behavioral principles that guide the procedure.

Studies in the various applications of biofeedback combined with behavioral treatment report a range of 54-95 percent improvement in incontinence across different patient groups. In addition, several studies have demonstrated that biofeedback, used in conjunction with other behavioral treatment techniques, helps reduce symptoms associated with neurologic disorders (Middaugh, Whitehead, Burgio et al, 1989; Tries, 1990). For example, EMG feedback can reduce elevated striated urethral activity associated with bladder-sphincter discoordination, thereby

decreasing elevated PVR volumes (Tries, 1990). Although behavioral interventions using biofeedback are highly effective in reducing incontinence (Burgio, Whitehead, and Engel, 1985; Baigis-Smith, Smith, Rose et al, 1989; Burton, Pearce, Burgio et al, 1988), further investigation is needed to determine the full extent to which biofeedback can help incontinence from neurologic disorders and to predict who would most likely benefit from the intervention.

Combined analyses of behavioral techniques in community-dwelling adults. Combined analyses were conducted on 22 articles that dealt with all behavioral interventions (UI Guideline Panel, 1992). The articles were reviewed by a subcommittee of behavioral experts and then by external reviewers. Standardized measures of efficacy reflecting the percent of wetness and dryness were defined and applied to each article. Authors were contacted for original data when necessary. The number of patients studied in the combined analyses was 887. The average age of patients ranged from 30 to 73 years, with an overall average of 53 years. Both males and females were treated. The number of baseline incontinent episodes ranged from 4 to 21 per week, per article, with an overall average of 16 per week. Similarly, the number of incontinent episodes at the end of treatment ranged from 0 to 12 per week, per article, with an overall average of 6 per week. Based on the weighted combined data, the average percent reduction in incontinence frequency at the end of treatment is 64.6 percent with a 95 percent confidence interval ranging from 58.8 percent to 70.4 percent.

Recently, two randomized controlled trials (Fantl, Wyman, McClish et al, 1991; Burns, Pranikoff, Nochajski et al, 1990) reported on the effectiveness of behavioral techniques in elderly incontinent women living in the community. In both studies, a standardized voiding diary was used to measure the frequency of UI. The two studies reported that the cure/improvement (50 percent or more improvement) rate after 6 weeks of treatment was 70 percent (16 percent cured and 54 percent improved) and 87 percent (12 percent cured and 75 percent improved). Both studies reported that improvement was maintained for at least 6 months. Another recently published randomized but not controlled study (Wells, Rink, Diokno et al, 1991) utilizing pelvic muscle exercise reported a subjective cure/improvement rate of 77 percent, an outcome similar to the two preceding studies.

The results of these studies indicate that behavioral treatments in outpatients appear to be effective in significantly reducing, if not curing, UI. These treatment results are obtained with no reported adverse side effects or complications. The cost of behavioral treatments compared with other treatments has not been studied. Similarly, no studies of patient preference have been conducted to evaluate behavioral treatments.

Electrical Stimulation

Electrical stimulation involves stimulating the pelvic viscera, the pelvic muscles, or the nerve supply to these structures. This technique has been used to manage both bladder and urethral dysfunction in both neurologically and nonneurologically impaired persons. Stimulation of the afferent fibers facilitates storage by modifying bladder sensation, and stimulation of the efferent fibers to the detrusor muscle can induce bladder contraction. Electrical stimulation may also be used to inhibit detrusor overactivity by influencing the sacral micturition reflex arc (Tanagho, 1990; Vodusek, Plevnik, Vrtacnik et al, 1988). Adverse reactions include pain and discomfort. Studies vary regarding the type and placement of electrodes; frequency, duration, and amplitude of voltage; and whether the stimulation was phasic, intermittent, or continuous, making generalizations across studies difficult (Bergmann and Eriksen, 1986; Eriksen, Bergmann, and Mjolnerod, 1987; Eriksen, Bergmann, and Eik-Nes, 1989; Fall, Ahlstrom, Carlsson et al, 1986; Leach and Bavendam, 1989; Fall, Erlandson, and Pettersson, 1984; Eriksen and Mjolnerod, 1987; Nakamura, Sakurai, Tsujimoto et al, 1986; Nakamura, Sakurai, Sugao et al, 1987; Ohlsson, Fall, and Frankenberg-Sommar, 1989; Shepherd, Blannin, and Feneley, 1982).

Research is needed to determine the efficacy of electrical stimulation either when used alone or in combination with other management strategies to treat UI. Standardization of the parameters of the techniques used, such as that proposed by the International Continence Society, is necessary to allow comparison of study results. Thus, advanced training and cautious use of this technique are recommended. Ideal parameters for electrotherapies have not been established by controlled clinical trials, and research needs to be conducted before this technique becomes a standard treatment for UI.

Behavioral Techniques in the Nursing Home

UI should not be accepted as inevitable in nursing homes.

The severity of UI in nursing home residents is often aggravated by the effects of institutionalization, declining medical conditions, reversible conditions, and inconsistent nursing care. Behavioral interventions such as habit training (timed voiding) and prompted voiding techniques have been shown to improve incontinence in nursing home residents significantly. These techniques can even be

effective with cognitively impaired persons, and such persons should not be excluded automatically from toileting programs. Instead, all nursing home residents should be carefully assessed for their responsiveness to toileting programs. In certain cases, pelvic muscle exercises, bladder training programs, and biofeedback may be applicable.

As detailed in the Resident Assessment Protocol issued by HCFA in response to the Omnibus Budget Reconciliation Act (OBRA) 1989 regulations, nursing home standards should include systematic evaluation/screening for UI of all admitted patients. If an incontinent person is admitted to a nursing home, assessment should include an evaluation of at least nine parameters. These include:

- Assessment of bowel and bladder function
- Review of medications
- Observation of toileting behavior including urinary frequency
- Evaluation/identification of antecedents of incontinence
- Evaluation of degree of responsiveness to prompts to void
- Physical examination to determine presence of fecal impaction
- Pelvic examination for the presence of pelvic abnormalities
- Urinalysis
- Estimation of PVR volumes.

A trial toileting program should be initiated. Persons who are not responsive to toileting should be carefully checked at 2-hour intervals and changed promptly when wet. To avoid sleep disruption, changing and toileting schedules should be individualized at night. The likelihood of success is highest among those with less cognitive and mobility impairment. Decisions about further management of residents who do not respond to a toileting program alone should consider the residents' general condition and preferences. In some cases, a simple checking and changing procedure is appropriate. In other cases, consideration of pharmacologic or surgical treatment may be indicated.

Simple in-service training is not sufficient to ensure that nursing staff maintain toileting programs (Schnelle, Newman, and Fogarty, 1990). Ongoing staff management systems in combination with training can be used to improve care significantly and maintain it at a high level (Schnelle, Newman, Fogarty et al, 1991; Burgio, Engel, Hawkins et al, 1990). Measures to monitor how well incontinence care is delivered must be collected by quality assurance personnel.

Combined analyses of behavioral techniques in the nursing home. A review of available published literature revealed that habit training and prompted voiding was effective in the 428 persons studied (UI Guideline Panel, 1992). When checked every 2 hours during waking hours, on average, patients

were dry 70 percent of the time at baseline. After treatment, that figure rose to 81 percent. Information is not available concerning nighttime leakage or the effects of other behavioral techniques. These techniques have the potential to reduce the costs and improve the quality of life for long-term care patients (McCormick, Cella, Scheve et al, 1990).

Physical, social, and environmental alterations. The traditional focus of health care is to assess and treat the individual for UI. The physical and/or social environment, however, may also contribute to the individual's UI and should be included in a comprehensive assessment, particularly where functional impairment of the person is present. An environmental evaluation should include determination of toilet access both during the day and at night, assessment of the need for grab bars in the bathroom and for adjusting toilet seat height, the adequacy of lighting to reach the bathroom, the impact of color contrasts of walls and the doorway to the bathroom, and the need for toilet supplements such as commodes and urinals. Walkers, canes, and other mobility aids may also be helpful in assisting the client to get safely to the toilet in time to maintain continence. Assessment of the need to adjust garments to make disrobing easier should also be considered. For instance, the substitution of self-gripping fabric fasteners for buttons or zippers can significantly decrease disrobing time. For persons needing assistance with toileting, a call system within easy reach is essential.

Chairs designed for ease in rising are especially helpful. In one study of elderly institutionalized residents who were considered chairbound, 77 percent could rise unaided from a chair that was 17 inches at seat height and had arms 10 inches above the seat (Finlay, Bayles, Rosen et al, 1983). In addition, chairs equipped with seats that raise and lower electrically greatly aid persons with impaired mobility. For persons who are chairbound, urination can be accomplished. For a man in a wheelchair, this can be done by moving close to the toilet and leaning forward to void. Women in wheelchairs, after positioning themselves in front of the toilet, can use a funnel-shaped device that fits under the vulva area and channels urine into the toilet (HIP, 1984).

The use of restraints has recently been targeted as contributing to UI (Evans and Strumpf, 1990). Physical restraints include various straps and ties as well as "geri-chairs." In addition, sedating drugs can act as a chemical restraint, which can also increase the potential for UI. It is now recognized that alternatives to restraints are almost always available. These alternatives maximize freedom of movement but ensure safety of the individual.

Pharmacologic Treatment of Incontinence [1,2]

Several drugs are effective for treating certain types of UI.

Several medications have proven to be beneficial for treating UI, although the panel and reviewers found flaws in study design that make it difficult to gauge their degree of efficacy precisely. Some of the limitations of published trials include inadequate description of subject selection, sample size, and specification of outcome criteria; short study durations; fixed drug doses that may be excessive or inadequate; analyses confounded by other interventions such as behavioral manipulations; and nonuniform and usually unspecified criteria for collecting, reporting, and comparing side effects. Summarized below and in Tables 3 and 4 are data derived from randomized placebo-controlled trials of orally administered medications used to treat UI.

Drugs for Incontinence due to Detrusor Overactivity: Urge Incontinence

There is little consensus regarding the correlation between symptomatic and urodynamic response of detrusor overactivity to medication. In general, all active medications used to treat storage disorders increase bladder capacity and, to a lesser degree, residual urine. In addition, uninhibited contractions remit more often on therapy than on placebo, but they persist in many patients, even those who subjectively improve. Because of these considerations, detailed cystometric data are not reviewed further.

Propantheline. Anticholinergic agents block contraction of the normal bladder and probably the unstable bladder as well. The prototype of anticholinergic agents used for urologic conditions is propantheline. Although its central nervous system side effects are less marked, no agent better approximates atropine's effect on the bladder in vitro. Moreover, propantheline is inexpensive and has been widely used over time.

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[1]Of the pharmacologic treatments discussed in this chapter, only oxybutynin and flavoxate have been officially approved by the FDA for the indicated use. The remainder are not approved but commonly used.

[2]Imipramine is officially approved by the FDA for enuresis in children but not adults.

Table 3. Summary of drugs for urge incontinence*

	Propantheline	Oxybutynin	Tricyclic antidepressants	Terodiline
Number of RCTs	5	6	3	7
Number of nursing home sites	3	1	1	0
Number of patients	259	309	265	278
Percent female	82	90	NS	94
Dose tested	15-30 mg tid-qid; ± 60 mg qhs	5 mg bid-qid	Imipramine, 25-100 mg, total daily dose	12.5-25 mg bid-tid
Study duration	4 d-4 wk	1-4 wk	3-8 wk	3-8 wk
Percent cure+	0-5	28,44	31	18,33
Percent UI reduction+	0-53	9-56	20-77	14-83
Percent side effects (percent dropouts)++	0-50 (0-9)	2-66 (3-45)	0-70	14-40 (2-8)

*Includes drugs used for overactive detrusor with demonstrated efficacy in at least two randomized, blinded, placebo-controlled trials.

+Percent cure or reduction of baseline UI frequency while on active drug minus percent while on placebo.

++Figures are the difference in percent of side effects on active drug compared with placebo. Figures in parentheses are percent of dropouts in trial ascribed to drug minus percent ascribed to placebo.

RCTs = randomized controlled trials; NS = not significant.

Despite its success in uncontrolled case series, only five adequately controlled trials of propantheline could be identified (Dequecker, 1965; Zorzitto, Jewett, Fernie et al, 1986; Andersson, 1988; Holmes, Montz, and Stanton, 1989; Wein, 1990), three of which included only elderly nursing home residents with advanced dementia. Only one of four found a benefit with a dose of 15 mg, tid-qid. Two of the nursing home studies evaluated higher doses of propantheline (30 mg, qid; 15 mg, tid + 60 mg, hs) and found that incontinence frequency was reduced by 13-17 percent over placebo—a small but statistically significant improvement in both studies (Dequecker, 1965; Zorzitto, Jewett, Fernie et al, 1986). In one of

these trials, side effects were reported in one-half of the subjects, one-fifth of whom withdrew because of severe side effects; no side effects were reported in the trial using the 60-mg, hs dose. In addition to urinary retention, side effects associated with all anticholinergic agents include visual blurring, xerostomia, nausea, constipation, tachycardia, drowsiness, and confusion; the most common of these is dry mouth. All anticholinergic drugs are contraindicated in patients with narrow-angle but not wide-angle glaucoma.

Despite the lack of adequate trials, there appears to be a consensus among experts that at least for less impaired patients who can tolerate full doses, propantheline is effective and recommended (Andersson, 1988; Wein, 1990). The recommended doses are 7.5-30 mg administered in the fasting state three to five times/d; higher doses may be required.

Oxybutynin. Oxybutynin has both anticholinergic and direct smooth muscle relaxant properties. Six randomized controlled studies were identified. Oxybutynin proved superior to placebo in all five studies of middle-aged outpatients, reducing incontinence frequency by 15-56 percent over the response to placebo (Tapp, Cardozo, Versi et al, 1990; Holmes, Montz, and Stanton, 1989; Zeegers, Kiesswetter, Kramer et al, 1989; Riva and Casolati, 1984; Moore, Hay, Imrie et al, 1990). In the two studies that reported it, 44 percent and 57 percent of subjects became subjectively continent, a much better result than occurred with placebo. The only trial that failed to note a benefit utilized oxybutynin less frequently (5 mg, bid) and for elderly nursing home residents (Zorzitto, Holliday, Jewett et al, 1989).

Side effects were noted in all studies and included dry skin, blurred vision, nausea, constipation, and marked xerostomia. Severity increased with dosage, with severe mouth dryness occurring in 84 percent of subjects receiving 5 mg of oxybutynin four times/d.

Oxybutynin is recommended for the treatment of detrusor overactivity. The recommended dose is 2.5-5 mg taken orally three to four times/d.

Calcium channel blocking agents. Influx of extracellular calcium is important for detrusor muscle contraction and can be blocked by calcium channel antagonists. Although such agents are often advocated for bladder storage disorders, only a few small, but favorable, case series were identified in the literature. No controlled studies could be found for nifedipine, diltiazem, or verapamil. A positive placebo-controlled study of flunarizine was identified, but in a subsequent 1-month controlled trial by the same investigators, its efficacy diminished and the high (but unreported) rate of side effects led the investigators to temper their original enthusiasm (Palmer, Worth, and Exton-Smith, 1982). At this time, these agents are not recommended for general use for the treatment of detrusor overactivity.

Terodiline. In vitro, terodiline has both anticholinergic and calcium channel blocking activity. Seven randomized controlled studies were identified, which included a total of 278 largely middle-aged women (Gerstenberg, Klarskov, Ramirez et al, 1986; Klarskov, Gerstenberg, and Hald, 1986; Lukkarinen, Grohn, Wilen-Rosenqvist et al, 1987; Peters, 1984; Petersen and Jakobsen, 1987; Tapp, Fall, Norgaard et al, 1989; Ulmsten, Ekman, and Andersson, 1985). In all trials but two (Petersen and Jakobsen, 1987; and not specified in Ulmsten, Ekman, and Andersson, 1985), terodiline was superior to placebo and reduced incontinence frequency by 14-83 percent over placebo; omitting the small study in which statistical significance was not specified, the range was 14-50 percent. In the two studies that reported it, 25 percent and 72 percent of patients became continent but neither figure was statistically superior to the response to placebo. Mild side effects were noted in 20-60 percent of patients; most common were impaired visual accommodation and xerostomia.

Terodiline was undergoing clinical trials in this country, but recent reports of its association with serious ventricular arrhythmia have resulted in its temporary withdrawal from the European market and may prevent its Food and Drug Administration approval.

Tricyclic agents. Although tricyclic agents are widely used, only three randomized controlled studies were identified. One showed that imipramine, desipramine, and nortriptyline each resulted in a statistically significant reduction in the number of "wet nights" in a psychiatric hospital (Milner and Hills, 1968). Side effects were rare and minor except for paralytic ileus in one case.

The other two studies, one using doxepin (Lose, Jorgensen, and Thunedborg, 1989) and one, imipramine (Castleden, Duffin, and Gulati, 1986), documented decreases in incontinence frequency, but the results were statistically significant only for nocturnal incontinence and overall patient preference while taking doxepin. Side effects in these studies included fatigue, xerostomia, dizziness, and blurred vision in the doxepin group and nausea and insomnia in the imipramine group. In older patients, these agents also have been associated with an increased risk of falling and hip fracture.

Although studies are limited, panel members believe that imipramine and doxepin should be recommended as beneficial. The usual oral doses are 10-25 mg initially administered one to three times/d, but less frequent administration is usually possible because of the drugs' long half-life; the daily total dose is usually 25-100 mg.

Flavoxate. Flavoxate is a tertiary amine that has been demonstrated in vitro to have smooth muscle relaxant properties. Although flavoxate is widely used for incontinence, only four randomized controlled studies of its efficacy for UI could be identified (Meyhoff, Gerstenberg, and Nordling, 1983; Robinson and

Brocklehurst, 1983; Zeegers, Kiesswetter, Kramer et al, 1989; Chapple, Parkhouse, Gardener et al, 1990). None demonstrated a significant benefit. At present, this drug is not recommended for the treatment of UI.

Dicyclomine hydrochloride. Dicyclomine is an anticholinergic agent with smooth muscle relaxant properties. Two randomized controlled trials were identified (one a completed study and one a pilot study) which included a total of 40 patients (Beck, Arnusch, and King, 1976; Castleden, Duffin, and Millar, 1987). In the completed study, 62 percent of subjects improved on dicyclomine 10 mg tid (90 percent of whom became continent) compared with 20 percent on placebo (65 percent of whom became continent); statistical significance was not specified, and side effects were not mentioned. Results were similar in the smaller pilot study.

Although these small studies do not definitely demonstrate effectiveness of dicyclomine, clinical experience suggests that it is as effective as other anticholinergic agents in controlling detrusor overactivity. It is therefore recommended as an alternative to other acceptable anticholinergic agents. The dose is 10-20 mg taken orally three times daily.

Other drugs of possible benefit. Other drugs used for detrusor overactivity include nonsteroidal anti-inflammatory drugs (Cardozo, Stanton, Robinson et al, 1980), a beta-adrenergic agonist (terbutaline) (Lindholm and Lose, 1986), a spinal synaptic inhibitor (baclofen) (Taylor and Bates, 1979), a quaternary ammonium antimuscarinic agent (fentonium bromide) (Milani, Merlo, Scalambrino et al, 1986), and procaine hematoporphyrin (Hall, Briggs, Lee et al, 1987). Limited studies and clinical experience with these agents suggest that further studies must be done before they can be recommended for general use.

Summary. Pharmacotherapy, at least in short-term trials, appears to be beneficial for many patients with urge incontinence due to detrusor hyperactivity. However, regardless of the agent chosen, involuntary bladder contractions are usually not abolished, the "warning time" between appreciation of the need to void and the onset of bladder contraction is usually not affected, the degree of improvement is modest, and "cure" is uncommon. In addition, many of these medications are costly, and most have bothersome side effects. Thus, these drugs should be used only in conjunction with a voiding schedule or behavioral intervention and only after other factors contributing to incontinence have been addressed.

To date, no agent recommended above has proved better than another. Thus, selection must be individualized and based on the side effects most desired or unwanted, as well as the impact of the drug's half-life and onset of action. For instance, an antidepressant may be the preferred drug for urge incontinence in a depressed patient but not for a patient with orthostatic hypotension who is prone to falling. A drug with a rapid onset of action may be useful for a patient who

desires protection only for certain events (e.g., going out for the afternoon), whereas a drug with a longer half-life might be preferable for a patient who desires continuous protection.

Regardless of the agent selected, the initial dose should be relatively low. The dose should be increased slowly, consistent with the drug's half-life, and titrated to balance efficacy with side effects. Patients must be closely monitored for urinary retention. Combining agents with different mechanisms of action may increase their efficacy and reduce side effects, but few relevant data are available. Although the long-term efficacy of bladder relaxants is largely unknown, a few investigators have reported that once incontinence has responded to pharmacologic and behavioral interventions, improvement may persist even if the medication is withdrawn after a few months.

Drugs for Incontinence due to Urethral Sphincter Insufficiency: Stress Incontinence

The effectiveness of pharmacologic therapy for UI due to urethral sphincter insufficiency (stress UI) is based on the high concentration of alpha-adrenergic receptors in the bladder neck, bladder base, and proximal urethra. Sympathomimetic drugs with alpha-adrenergic agonist activity presumably cause muscle contraction in these areas and thereby increase bladder outlet resistance.

Pharmacotherapeutic strategies designed to increase bladder outlet resistance include the use of drugs with direct alpha-adrenergic agonist activity, estrogen supplementation for both direct effect on urethral mucosal and periurethral tissues and enhancement of alpha-adrenergic response, and beta-adrenergic blocking drugs which might allow unopposed stimulation of alpha receptor-mediated contractile muscle responses.

Alpha-adrenergic agonist drugs

Phenylpropanolamine. Phenylpropanolamine in sustained release form is the major alpha-adrenergic agonist drug studied in women with stress incontinence. Review of eight prospective randomized controlled studies of middle-aged, normotensive women with stress incontinence showed that in three studies (Collste and Lindskog, 1987; Fossberg, Beisland, and Lundgren, 1983; Lehtonen, Rannikko, Lindell et al, 1986) no patients became dry but 31-45 percent of patients given PPA had decreased incontinence over placebo response (PPA minus placebo improved response). In five studies (Ek, Anderson, Gullberg et al, 1978; Lose, Rix, Diernaes et al, 1988; Hilton, Tweddell, and Mayne, 1990; Walter, Kjaergaard, Lose et al, 1990; Wells, Rink, Diokno et al, 1991), 9-14 percent of women became dry and 19-60 percent of patients experienced significant reduction of incontinence over the number of similar responses from patients receiving

Table 4. Summary of drugs for stress incontinence*

	Alpha-adrenergic agonists	Estrogen supplementation (postmenopausal)		
	Phenylpropanolamine	Quinestradiol	Piperazine estrone	Estriol
Number of RCTs	8	1	1	2
Number of patients	248	18	36	25
Average age (range)	55 (33-90)	79.6 (66-92)	57.2 (47-72)	62 (42-76)
Dose tested	50 mg bid	0.25 mg qid	3 mg	4 mg
Study duration (range)	4 wk (2-6 wk)	4 wk	3 mo	5 wk (4-12 wk)
Percent cure+	0-14	0	0	0;14 (S)
Percent UI reduction >placebo+	19-60 (S in 5 RCTs)	89 (S)	20 (NS)	0;29 (S)
Percent side effects (percent dropouts)++	5-33 (0-4.3)	0 (0)	11	11-28 (0;0)

placebo. In papers where the improvement rate was reported, the reduction in leakage while on PPA ranged from 31 percent to 60 percent over the response while on placebo.

Side effects were minimal and included nausea, dry mouth, insomnia, rash, itching, and restlessness. Phenylpropanolamine did not cause significant increases in blood pressure.

Summary. Pharmacologic therapy of incontinence due to sphincteric insufficiency (stress incontinence) using PPA appears to result in few cures or dryness (0-14 percent) but subjectively may improve 30-60 percent of patients over placebo response. It is unclear whether patient age or the severity of leakage affects the likelihood of response. Possible side effects from adrenergic agonist drugs include anxiety, insomnia, agitation, respiratory difficulty, headache, sweating, hypertension, and cardiac arrhythmias, all of which may occur more commonly in elderly patients. The risk of PPA use in hypertensive women and its

Table 4. Summary of drugs for stress incontinence*—Continued

	Combined alpha-adrenergic and estrogen supplementation		
	Phenylpropanolamine and intravaginal or oral conjugated estrogen	Phenylpropanolamine and estriol	Norephedrine and estradiol valerate
Number of RCTs	1	2	1
Number of patients	60	57	13
Average age (range)	45-70	61 (42-76)	61 (38-71)
Dose tested	50 mg bid 1.25 mg/d	50 mg bid 4 mg/d	100 mg bid 2 mg/d
Study duration	4 wk	8-12 wk	8 wk
Percent cure+	0	15 (S)§; 64 (S)	23 (S)
Percent UI reduction >placebo+	Slight (NS)	37 (S)§; 7	38 (S)
Percent side effects (percent dropouts)++	10 (8)	18-38 (0)	15 (12.5)

*All female subjects, randomized controlled trials.
+Percent of subjects cured or improved while on active drug minus percent while on placebo.
++Figures are the difference in percent of side effects on active drug compared with placebo. Figures in parentheses are the percent of dropouts in trial ascribed to drug minus percent ascribed to placebo. (In some papers it was not mentioned or information is incomplete.)
§Combined phenylpropanolamine and estriol compared with estriol only, not placebo.
RCTs = randomized controlled trials; S = significant difference between active drug and placebo (or drug as specified); NS = not significant.

efficacy in women taking antihypertensive drugs have not been determined. Phenylpropanolamine should be used with caution in patients with hypertension, hyperthyroidism, cardiac arrhythmias, and angina. The recommended dose for PPA is 25-75 mg in sustained release form, administered orally, twice daily.

Estrogen therapy. Because the vagina and urethra are of similar embryologic origin, estrogen supplementation in postmenopausal women may

restore urethral mucosal coaptation and increase vascularity, tone, and the alpha-adrenergic responsiveness of urethral muscle, which in turn may increase bladder outlet resistance and decrease stress incontinence. However, the exact role of estrogen, as well as its mechanism of action, is still unknown and deserves further research.

Estriol derivatives. A trial of quinestradol, an estriol derivative, in female incontinent nursing home residents did not result in continence, but 89 percent of patients had a significant reduction of leakage episodes while taking it, compared with 0 percent while on placebo (Judge, 1969).

Two studies of postmenopausal women with stress incontinence compared effects of placebo and estriol, 4 mg/d, on continence (Walter, Kjaergaard, Lose et al, 1990; Samsioe, Jansson, Mellstrom et al, 1985). Results showed that 0-14 percent of patients on estriol became dry, and 29 percent of patients experienced improved continence compared with patients receiving placebo. One study showed that the response to active drug was significantly better than to placebo, whereas the other study showed that the response to active drug was not significantly better than to placebo. In the latter study, where stress incontinence was not improved, 66 percent of patients with urge incontinence reported improvement.

Estrone derivatives. A 3-month prospective study of postmenopausal stress incontinent women receiving piperazine estrone sulfate for 3 weeks with 1 drug-free week per cycle or placebo revealed that subjective and objective (diary, Urilos test, UPP) improvements at 3 months were better, but not statistically significant, while on estrogen (Wilson, Faragher, Butler et al, 1987). Side effects included palpitations and trembling, and one patient in the estrogen group had a myocardial infarction, although this is not considered an acute side effect. Breast tenderness, leg and chest pain, and nausea were uncommon and not increased by estrogen therapy.

Summary. Evidence suggests that estrogen therapy by oral or vaginal administration may benefit some patients with stress UI but may be more beneficial in ameliorating the symptoms of urge UI. Other beneficial effects of long-term estrogen may include decreased risk of stroke, ischemic heart disease, and osteoporosis. Estrogen replacement should be given with a progestin when the uterus is present to avoid unopposed estrogen stimulation of the endometrium, particularly if prolonged therapy is anticipated. Risks of estrogen therapy given in this manner include neoplasia of estrogen responsive organs and thromboembolism. It is contraindicated in patients with known or suspected cancer of the breast, cervix, or uterus, as well as in patients with active thrombophlebitis or thromboembolic disorders. Doses of estrogen and progestin vary. Conjugated estrogen is usually administered either orally (0.3-1.25 mg/d) or vaginally (2 g or

fraction/d). Progestin (e.g., medroxyprogesterone 2.5-10 mg/d) may be given continuously or intermittently.

Combined alpha-adrenergic agonist and estrogen supplementation therapy. The rationale supporting combined estrogen supplementation and alpha-adrenergic agonist therapy in postmenopausal women with incontinence due to sphincteric insufficiency includes an estrogen-induced increased number and/or sensitivity of alpha-adrenergic receptors in the urethra which potentiates the alpha-adrenergic contractile response to drug stimulation.

Review of four controlled studies combining estrogen and alpha-adrenergic agonist therapy suggests that the combined therapy may provide some enhancement of adrenergic agonist therapy alone (Hilton, Tweddell, and Mayne, 1990; Walter, Kjaergaard, Lose et al, 1990; Ek, Andersson, Gullberg et al, 1978; Ek, Andersson, Gullberg et al, 1980). However, studies are limited, and based on these results and the clinical experience to date, combination therapy may be considered when initial single drug therapy fails. The possible side effects and risks of adrenergic agonist drugs and estrogen do not appear to be increased when used together but should be kept in mind when combined therapy is prescribed.

Drugs of Possible Benefit

Imipramine. A tricyclic antidepressant with both alpha-adrenergic agonist activity presumably mediated by blocking re-uptake of norepinephrine and anticholinergic properties has been reported to benefit women with stress incontinence. Side effects reported include nausea, insomnia, weakness, fatigue, and postural hypotension. Although prospective controlled studies are not available, clinical experience suggests that imipramine is beneficial in the treatment of mixed stress and urge UI (Gilja, Radej, Kovacic et al, 1984). The usual recommended doses are 10-25 mg administered orally one to three times per day.

Propranolol. A beta-adrenergic blocking drug has been reported in one uncontrolled study to improve symptoms of stress UI (Gleason, Reilly, Bottaccini et al, 1974). It cannot be recommended for treatment of incontinence at this time.

Surgical Treatment of Urinary Incontinence

Surgical treatment of UI should be performed only after a precise, focused assessment, which requires a comprehensive clinical evaluation including estimation of surgical risk, an objective confirmation of the diagnosis and its severity, a correlation of anatomic and physiologic findings with the surgical plan, and an estimation of the impact of the proposed surgery on the patient's quality of life.

Surgery can provide an alternative to other therapies for UI.

Important Considerations

When the literature concerning surgical treatment of UI is reviewed, several caveats must be considered. The reporting of outcomes (cure, improvement, complications) is not standardized. Many authors report only total complication rates rather than specific complications. The statistical evaluation of patients who are lost to followup is not standardized. Success of any surgical procedure depends on operator expertise. A corollary is that early reports of a new procedure include higher complication rates and lower success rates than later reports. Successful surgery requires proper patient selection, a process that is not always well described in surgical series.

Other caveats include unknown selection biases with retrospective comparisons of different techniques. Prospective comparisons often include different surgeons with different degrees of experience and expertise. Last, most of the reported research has been done on young and middle-aged women.

The objectives of surgical treatment of incontinence depend on the specific etiology. A given patient may have more than one etiology. In this guideline, each etiology is addressed separately.

Incontinence due to Bladder Neck or Urethral Obstruction

Overflow incontinence should be ruled out during the basic evaluation. Post-void residual volume can be checked by catheterization or by pelvic ultrasound. If overflow incontinence is discovered, it should be determined whether it is caused by anatomic obstruction, detrusor weakness, or both, or by pharmacologic agents.

A patient with a persistently underactive detrusor with or without obstruction is best treated by intermittent catheterization (see pp. 59-60). If the patient or caregivers are unable to perform urethral catheterization, other options include indwelling urethral or suprapubic drainage, continent vesicotomy, or supravesical diversion.

If the etiology is anatomic obstruction with an adequately contracting detrusor and the patient has an acceptable level of surgical risk, the best treatment is surgery. In women, primary anatomic obstruction is extremely rare. Anatomic obstruction can result from prior anti-incontinence surgery or severe pelvic

prolapse such as prolapsing cystocele, uterine prolapse, and severe enterocele. Therefore, an incontinent woman who is a surgical candidate and suspected of having such an obstruction should undergo urodynamic evaluation. For women with pelvic prolapse, the evaluation must be tailored to determine the cause of incontinence (overflow UI secondary to obstruction, urethral hypermobility, etc.). Although urethral dilation is a common procedure, the panel's consensus is that no evidence supports a benefit of this intervention, although it may be useful for the extremely rare cases of primary obstruction. Visual internal urethrotomy should not be used to treat female urethral obstruction because of its high risk of creating total incontinence.

For women who are left with anatomic obstruction after anti-incontinence surgery, two types of procedures can be used to relieve the obstruction. One option applies to patients who have had a needle bladder neck suspension. For these patients, obstruction can usually be relieved by cutting one of the suspending sutures. To evaluate the outcome of this procedure, articles on a combined series of four studies (Vondermark, Brannen, Wettlaufer et al, 1979; Mundy, 1983; Huland and Bucher, 1984; Fowler, 1986) including 182 patients who had a needle bladder neck suspension were reviewed. Ten patients (5 percent) developed obstructive voiding difficulties (urodynamic evaluations were not described). After one suture was cut, all 10 patients had resolution of the obstructive symptoms, and only 1 had recurrence of incontinence.

The other option is applicable for almost any type of anti-incontinence procedure. This option is urethrolysis (cutting the adhesions that fix the urethra to the pubic bone) with or without repeating the bladder neck suspension. This option was described in two studies (Zimmern, Hadley, Leach et al, 1987; McGuire, Letson, and Wang, 1989). In one study, 13 patients were treated with urethrolysis and needle bladder neck suspension. Twelve patients resumed normal voiding. In another study, 13 patients were found to be obstructed urodynamically after various procedures, including retropubic suspension (6 patients), needle suspension (4 patients), and fascial sling (3 patients). Six of these patients had symptoms of urge UI. All patients underwent urethrolysis, but only three had additional anti-incontinence procedures (two patients had needle suspension and cystocele repair, and one patient had a fascial sling). Ten patients resumed normal voiding, and three remained obstructed. No patient had recurrence of incontinence in either report.

In elderly men, the most common cause of anatomic obstruction is benign prostatic hyperplasia (BPH) and, less frequently, urethral stricture and prostate cancer. Because of the risk of hydronephrosis and prostate cancer in incontinent men, screening tests (BUN, creatinine, upper tract imaging, prostate-specific antigen) have been recommended by several authorities. In the absence of more definitive data, clinical judgment is indicated (Courtney and Wightman, 1991;

DuBeau and Resnick, 1991, 1992; Cooner, Mosley, Rutherford et al, 1990; Oesterling, 1991; Webb, 1990; Neal, Styles, Powel et al, 1987; Catalona, Smith, and Ratliff, 1991). The treatment for urethral stricture and prostate cancer is not addressed by this guideline. The treatment of BPH is multifaceted and is being addressed by another guideline. For this document, remarks are limited to the effectiveness of prostatectomy for relieving symptoms of UI. Benign prostatic hyperplasia can cause two different types of incontinence. One type is overflow incontinence due to urinary retention. The other is urge incontinence, which is associated with BPH in some patients. The mechanisms for the development of detrusor instability in men with BPH are not completely understood.

Review of a large series of men who had acute urinary retention preoperatively indicated that 11 percent remained unable to void postoperatively (Mebust, Holtgrewe, Cockett et al, 1989). Of the patients without hypotonic bladder, 97 percent can be expected to resume voiding after transurethral prostatectomy (TURP).

Review of four articles reporting on men with urge incontinence before TURP revealed that 71 percent had resolution of their incontinence after TURP (Ball and Smith, 1982; Nielsen, Christensen, Madsen et al, 1989; Andersen, Bradley, and Bourne, 1976; Abrams, 1978). Eight percent of patients (19 of 248) on long-term followup had developed de novo urge UI.

Incontinence due to Detrusor Overactivity

Urge incontinence may be a manifestation of involuntary bladder contractions or decreased bladder compliance. These problems are diagnosed by clinical evaluation in some patients, and others require cystometry. Cystoscopy is recommended preoperatively for patients with irritative voiding symptoms because of the possibility of bladder stones or carcinoma. Many incontinent patients with detrusor overactivity are treated with medical and/or behavioral therapy initially, with surgical treatment considered if these other methods fail.

Several surgical procedures have been proposed for treating intractable, severe bladder instability or for those with poor compliance. The procedure of choice is augmentation cystoplasty with a patch of detubularized ileum or colon. The risks of the procedure include voiding difficulties, possibly requiring catheterization to empty the bladder, mucous formation, possible metabolic problems, and the rare, long-range possibility of tumor formation (Sidi, Becher, Reddy et al, 1990; Strawbridge, Kramer, Castillo et al, 1989; Lockhart, Bejany, and Politano, 1986; Raz, Ehrlich, Zeidman et al, 1988; Bramble, 1982). Therefore, it is essential that these patients receive careful long-term followup. As a last resort, severe debilitating detrusor instability or noncompliance can be treated with supravesical diversion.

Contraindications for augmentation cystoplasty include renal insufficiency, bowel disease, intractable urethral disease or inability to perform self-catheterization. Augmentation cystoplasty has risks and complications, but unfortunately, no better surgical alternatives exist, since sacral nerve stimulation is still investigational. Subtrigonal phenol injections (Rosenbaum, Shaw, and Worth, 1990; Wall and Stanton, 1989; Nordling, Steven, Meyhoff et al, 1986; Blackford, Murray, Stephenson et al, 1984; Ewing, Bultitude, and Shuttleworth, 1982) and bladder denervation (Alloussi, Loew, Mast et al, 1984; Diokno, Hollander, and Alderson, 1987; Hodgkinson and Drukker, 1977; Torring, Petersen, Kelmar et al, 1988; McGuire and Savastano, 1984; Rockswold, Chou, and Bradley, 1978; Opsomer, Klarskov, Holm-Bentzen et al, 1984; Lucas, Thomas, Clarke et al, 1988) are not presently recommended because the risk/benefit ratio is too great.

Male Incontinence due to Intrinsic Sphincter Deficiency

Urethral sphincter insufficiency in men may be due to congenital anomalies such as myelomeningocele or epispadias, or it may be acquired after prostatectomy (radical or transurethral) or radiation therapy. These patients must be evaluated for other possible causes of incontinence, including:

- Obstruction
- Detrusor instability
- Poor bladder compliance.

Postprostatectomy incontinence is not always due to sphincter insufficiency but sometimes to detrusor dysfunction or both. Preoperative evaluation should include cystoscopy as well as cystogram, cystometry, pressure flow, and/or videourodynamic studies. If an artificial sphincter is being considered, it is important to assess whether the patient has enough manual dexterity and ability to operate the device.

The choices for surgical treatment of male sphincter insufficiency include:

- Periurethral bulking injections
- Sling procedures
- Placement of an artificial sphincter.

Of these choices, the sling procedure in men has only occasionally been used, and the information available is insufficient for providing effective guidelines at this time. One important postsurgical side effect that is sometimes observed in patients with neuropathic bladder is the emergence of a poorly compliant bladder. After outlet resistance is increased, the bladder may store urine at high pressure, which leads to upper tract deterioration. Long-term followup for these patients is mandatory.

Periurethral bulking injections. The injection of materials such as polytetrafluoroethylene (PTFE) or collagen into the periurethral area can increase urethral compression. It is the consensus of the panel that periurethral injections are less likely to succeed in patients who have undergone pelvic radiation therapy. Combined analysis of all male incontinent patients treated showed an average cure rate of 32 percent, with a range of 0-49 percent and a 95 percent confidence interval that cure will be observed in between 12 percent and 52 percent of patients (Corrie, Rodriguez, and Thompson, 1989; Deane, English, Hehir et al, 1985; Osther and Rohl, 1988; Kaufman, Lockhart, Silverstein et al, 1984). The average percent of incontinent men cured or improved is 52 percent, with a range of 17-69 percent and a 95 percent confidence interval of 29-74 percent. Complications included infection, urinary retention for less than 2 days, urinary retention for 4 weeks until the PTFE was extruded and incontinence returned, fever, temporary erectile dysfunction, periurethral inflammatory reaction, and burning sensation or perineal discomfort. Particles of PTFE have been found in patients' lungs after periurethral injection, but the exact incidence and the clinical significance of this migration are not known.

One article described the use of periurethral collagen injections in 16 men with incontinence after radical or transurethral prostatectomy (Shortliffe, Freiha, Kessler et al, 1989). Three patients were cured or "greatly improved." Five were improved, seven failed, and one died before his status was determined. Most patients who failed had unstable or noncompliant bladders, which suggests that these may not be appropriate candidates to receive collagen therapy. The only complication was urinary retention for 10 days in one patient.

Periurethral collagen injections also were described in one abstract concerning the first 108 males receiving collagen for UI (McGuire, Wang, Appel et al, 1990). Results revealed a 76 percent continence rate for greater than 12 months. The average volume injected was 37.3 mL, and the average number of treatments was 3.3. Complications were not listed.

Placement of an artificial sphincter. This is the most commonly used surgical procedure for the treatment of male urethral insufficiency. When dealing with postprostatectomy incontinence, it is advisable to wait at least 6 months to a year before implanting an artificial sphincter and to try behavioral and pharmacologic intervention first. Results of a combined series of studies indicated that 82 percent of patients were dry or satisfied with minimal incontinence, 7 percent were improved, and 10 percent were failures (Gundian, Barrett, and Parulkar, 1989; Schreiter, 1985; Marks and Light, 1989; Nordling, Holm-Bentzen, and Hald, 1986; Lowe, Schertz, and Parsons, 1988).

Complications included infection, hematoma, cuff site erosion or atrophy, fluid leak, tubing kink, inadequate cuff compression, urethral injury, pump erosion,

herniated reservoir and pump malfunction, and other mechanical difficulties. Overall combined complication rate was 32 percent.

Female Incontinence due to Urethral Hypermobility and Intrinsic Sphincter Deficiency

The surgical objective in cases of hypermobility is to restore the sphincter unit to an appropriate retropubic position without obstruction, whereas the goal of surgery for ISD is to increase urethral coaptation and resistance. Although many operations result in both reposition and compression of the proximal urethra, a primarily repositional procedure is less likely to succeed for a patient with ISD than for a patient with only hypermobility.

Preoperative evaluation. A preoperative evaluation is important to ensure proper patient selection and to determine the appropriate surgical procedure. The evaluation should include a comprehensive history, physical examination, urinalysis, urine culture, and measurement of PVR volume. It is important to document the incontinence objectively by direct observation of a positive stress test (direct visualization). When further corroboration is needed, cystoscopy, cystogram with straining, Valsalva leak point pressure, and/or dynamic urethral profilometry may be used.

Although patients with symptoms of detrusor instability may be more likely to remain incontinent after surgery, it is unclear whether a preoperative CMG to search for asymptomatic instability is necessary. If symptomatic instability is present, some clinicians may attempt behavioral or pharmacologic treatment before surgical correction of the stress incontinence. Others may not, since many patients experience resolution of their detrusor instability once their stress incontinence is corrected. This decision must be made on an individual basis by clinical judgment and consideration of the patient's informed preference.

To select the appropriate procedure, the position of the urethra and the degree of axial urethral mobility should be assessed by physical examination, cystogram, or cystoscopy. Factors that may be associated with an increased risk of failure, such as symptomatic detrusor instability, obesity, prior surgery, hypoestrogenism, chronic cough, strenuous physical activity, radiation therapy, advanced age, or poor nutrition must be identified. It is also important to identify pelvic prolapse or other pathology that would require surgical attention at the same time as the anti-incontinence procedure. The approach required to treat the concurrent pathology will influence the choice of approach for the anti-incontinence procedure. The extent of the evaluation depends on the complexity of the presentation.

It is also important to assess the degree of ISD preoperatively. This can be done using a combination of assessment tools. In the history, patients who have only hypermobility describe leakage with vigorous activity, whereas patients with ISD tend to have leakage with minimal activity. On physical examination, patients with incontinence due to hypermobility have descent of the urethra and bladder neck during stress maneuvers. On the other hand, reproducible demonstration of stress incontinence through a correctly positioned urethra is diagnostic of ISD. Further corroboration of ISD may be established by cystoscopy, cystography, and dynamic urethral manometry. Cystoscopic visualization of an open urethra at rest is suggestive of ISD. In patients with severe incontinence, a maximal urethral pressure of less than 15 cm of water on static urethral pressure profilometry may suggest ISD, although further confirmation of this observation is still needed. On lateral cystogram, patients with only hypermobility have a closed urethra at rest and urethral descent with leakage of contrast during stress maneuvers. Patients with ISD have an open urethra at rest, and they often leak while standing still. Most of these assessment tools do not provide a definitive diagnosis alone, especially if the patient has coexistent detrusor instability, which can cause opening of the bladder neck at rest. Therefore, the entire clinical picture must be considered.

Procedures for hypermobility. After complete evaluation, the proper surgical procedure is selected according to certain general principles. If the primary pathophysiologic defect appears to be urethral hypermobility or displacement, three main types of procedures are used:

- Anterior vaginal repair
- Retropubic suspension
- Needle suspension.

Review of the available literature shows that the retropubic and needle suspension procedures produce a superior result to that of the anterior repair in "curing" UI and, therefore, are the two preferred techniques for the surgical treatment of urethral hypermobility. The option selected depends on the surgeon's training and expertise and on the presence of concurrent pathology that would require correction by a vaginal or abdominal approach.

If ISD is present, the surgical procedure should be one with compressive effects: sling (abdominal or vaginal approach), periurethral bulking injection, or artificial sphincter. The choice must be individualized for each patient. Women who have severely damaged urethras require special procedures such as urethral or bladder neck reconstruction, urethral substitution, continent vesicotomy, or urinary diversion.

Anterior vaginal repair. The anterior vaginal repair category of treatments includes several modifications of the original Kelly plication. They all include some degree of dissection of the anterior vaginal wall from the overlying bladder base and urethra and plication of the pubocervical fascia. The extent of the dissection and the location and extent of the placating (elevating) sutures vary substantially among these techniques. Review of nine studies, incorporating 1,449 patients, reveals an overall "cure" rate of 62 percent (Stanton, Hilton, Norton et al, 1982; Lose, Jorgensen, and Johnsen, 1988; Park and Miller, 1988; Jouppila, Kauppila, Ylikorkala et al, 1977; Kujansuu, 1983; Bergman, Ballard, and Koonings, 1989; Bergman, Koonings, and Ballard, 1989; Beck, Thomas, and Maughan, 1968; Van Geelen, Theeuwes, Eskes et al, 1988). Only two studies gave their complication rates; their average was 14 percent.

Retropubic suspension. The category of retropubic suspension procedures also includes several different techniques performed through a low abdominal incision (retropubic approach). They all have in common elevation of the lower urinary tract (particularly the urethrovesical junction) within the retropubic space. They differ according to which structures are used to achieve the elevation. For the Marshall-Marchetti-Krantz procedure, the periurethral tissue is approximated to the symphysis pubis. For the Burch colposuspension, the vaginal wall lateral to the urethra and bladder neck is elevated toward Cooper's ligament. The paravaginal repair involves reapproximating the endopelvic fascia to the obturator shelf. To evaluate this category of procedures, 31 studies incorporating 2,788 patients were reviewed (UI Guideline Report, 1992). Total "cure" rates averaged 78 percent, with additional improvement of 5 percent. Complication rates averaged 18 percent.

Needle bladder neck suspension. The third type of anatomic correction employs needle suspension of the bladder neck. Variations of this procedure (Pereyra, Lebherz, Growdon et al, 1982; Stamey, 1980; Raz, 1981; Cobb and Ragde, 1978; Gittes and Laughlin, 1987) are all performed through a vaginal approach, and most utilize small suprapubic skin incisions. Anchoring tissues adjacent to the urethra and bladder neck are held by suspending sutures.

Of the 1,355 patients reviewed, the majority had the Stamey procedure; others had the Pereyra-Raz procedure. For the combined series, 84 percent were continent, 2 percent were "almost dry," 2 percent were improved, and 14 percent showed no improvement.

Complication rates ranged from 2 to 60 percent. Complications included UTI, urinary retention longer than 3 weeks' duration, obstructive symptoms, suture abscess, wound infection or vaginal granuloma, vesicocutaneous fistula, hematoma, sepsis, new onset of symptomatic detrusor instability, and prolonged suprapubic pain.

Procedures for intrinsic sphincter deficiency. Surgical procedures for management of ISD include:

- Sling procedures
- Placement of an artificial sphincter
- Periurethral bulking injections.

Sling procedures. The various sling procedures all involve the placement of a sling, made of either autologous or heterologous material, under the urethrovesical junction and anchoring it to retropubic and/or abdominal structures. The operation can be performed through an abdominal approach, a vaginal approach, or a combined abdominal and vaginal approach.

Data from a series of 376 patients with fascial slings indicated that 89 percent were cured, 6 percent were improved, and 4 percent showed no improvement (Deppe, Castro-Marin, Nachamie et al, 1978; Narik and Palmrich, 1962; Low, 1969; Beck, McCormick, and Nordstrom, 1988; McIndoe, Jones, and Grieve, 1987; Ridley, 1966; Raz, Siegel, Short et al, 1989; McGuire and Savastano, 1984; Spencer, Jequier, and Kersey, 1972; Kersey, 1983; Bryans, 1979). Five patients were lost to followup. The complication rate was 31 percent. Of 128 patients with slings made of synthetic material, 62 percent were cured, 15 percent were improved, and 17 percent showed no improvement. Two patients were lost to followup. The total complication rate for the series was 17 percent.

Although the total complication rate given for the fascial sling series was higher than that for the synthetic sling series, the synthetic sling caused more severe complications, many of which were directly attributable to local effects of the sling (erosion, nonhealing of the vaginal wall, abscess, vesicovaginal fistula). The panel concluded that fascial slings are preferable to synthetic slings because of their lower rate of local complications.

Data from 32 patients treated with the vaginal wall sling showed that 81 percent were dry, 3 (9 percent) were improved, and 3 (9 percent) showed no improvement. The total complication rate was 22 percent, and complications included urinary retention and new onset of irritative voiding symptoms.

Artificial sphincter. The artificial sphincter has also been used for females with ISD. Combined data from three studies of 105 women with ISD who received artificial sphincters indicate that 92 percent were dry, 4 percent almost dry, and 4 percent were not improved (Appell, 1988; Light and Scott, 1985; Diokno, Hollander, and Alderson, 1987). The complication rate was 32 percent. Complications included fluid leak, loose cuff, erosion or atrophy of cuff site, tubing kink, and infection.

Periurethral injections. Periurethral bulking injections also have been described in the section about male urethral abnormalities (see p. 52). In women, these injections are easily performed under local anesthesia. Combined data from five studies indicate that 59 percent of patients were cured, 16 percent were improved, and 25 percent showed no improvement (Berg, 1973; Deane, English, Hehir et al, 1985; Schulman, Simon, Wespes et al, 1983; Lewis, Lockhart, and Politano, 1984; Vesey, Rivett, and O'Boyle, 1988). Complications included urgency, UTI, and urinary retention. The total complication rate was 6 percent.

Another study examined women with ISD treated with periurethral collagen injections (McGuire, Wang, Appel et al, 1990). Sixty-nine percent were dry after treatment, nine (25 percent) were improved, and two (6 percent) showed no improvement. Collagen injections were also used for 10 women with urethral hypermobility, of whom 6 became dry, 1 improved, and 3 remained incontinent. Complications were not described.

Recommendations. The panel recommends that terminology be standardized for classification of incontinence, description and execution of surgical procedures, and reporting surgical outcomes. In reports of series, complications should be reported individually, and the criteria for patient selection should be described. Comparison of different techniques should be made by prospective randomized studies using similar inclusion criteria for each technique.

Tables 5, 6, and 7 summarize the outcomes of the various treatment options for urge and stress incontinence and for female ISD.

Table 5. Outcome of urge incontinence treatments*

Outcome	Treatment options	
	Behavioral technique: Bladder training	Pharmacologic: Anticholinergic
Percent cured	12	0-44
Percent improved	75	0-83
Percent side effects	None	0-70

*The figures used represent the average reported outcome within a given management option (e.g., behavioral, pharmacologic) based on the literature review. The figures do not apply equally across specific treatments within a given management option (e.g., pelvic muscle exercise vs. oxybutynin) because the studies lack uniformity in many critical issues including outcome criteria, types of subjects used, treatment protocol, followup period, analytical method, etc. The reader is referred to the guideline text for details.

Table 6. Outcome of stress incontinence treatments*

Outcome	Treatment options				
	Behavioral technique			Surgical technique	
	Pelvic muscle exercise	Bladder training	Pharmacologic: Alpha agonist	Retropubic suspension	Needle suspension
Percent cured	12	16	0-14	78	84
Percent improved	75	54	19-60	5	4
Total percent	87	70	19-74	83	88
Percent side effects	None		Minimal to 20	-	
Percent complications	None		5-33	20	

*The figures used represent the average reported outcome within a given management option (e.g., behavioral, pharmacologic, or surgical) based on the literature review. The figures do not apply equally across specific treatments within a given management option (e.g., pelvic muscle exercise vs. oxybutynin vs. retropubic suspension) because the studies lack uniformity in many critical issues including outcome criteria, types of subjects used, treatment protocol, followup period, analytical method, etc. The reader is referred to the guideline text for details.

Table 7. Surgical outcome for female intrinsic sphincter deficiency*

Outcome	Treatment options			
	Bulking technique		Sling operation	Artificial urinary sphincter
	Teflon	Collagen		
Percent cured	59	69	89	92
Percent improved	16	25	6	4
Percent cured/improved	75	94	95	96
Percent complications	6	-	31	32

*The figures used represent the average reported outcome within a given management option (e.g., bulking, sling, or artificial sphincter) based on the literature review. The figures do not apply equally across specific treatments within a given management option (e.g., Teflon vs. sling vs. sphincter) because the studies lack uniformity in many critical issues including outcome criteria, types of subjects used, treatment protocol, followup period, analytical method, etc. The reader is referred to the guideline text for details.

Other Measures and Supportive Devices

Other measures and supportive devices used in the management of UI include:

- Intermittent self-catheterization
- Indwelling catheters
- Suprapubic catheters
- External collection catheters
- Penile clamps
- Pessaries
- Absorbent pads or garments.

Intermittent Catheterization

Intermittent catheterization may be appropriate for the management of acute or chronic urinary retention.

The use of catheters inserted through the urethra into the bladder every 3-6 hours for bladder drainage is called intermittent catheterization (Lapides, Diokno, Silber et al, 1972). Nonsterile, clean intermittent catheterization (CIC) is a safe and effective therapy either on a short-term or long-term basis for persons who have overflow incontinence secondary to an inoperable obstruction, an underactive detrusor, or detrusor hyperreflexia with sphincter dyssynergia where urinary retention is the goal rather than treatment of the dyssynergic sphincter. Intermittent catheterization may be appropriate for the management of acute or chronic urinary retention. This type of catheterization is preferable to an indwelling Foley catheter because intermittent catheterization has a low incidence of symptomatic UTIs and bladder stone formation (Webb, Lawson, and Neal, 1990; Maynard and Diokno, 1984; Bennett and Diokno, 1984). Age should not deter the use of intermittent self-catheterization because many frail elders use this technique successfully (Bennett and Diokno, 1984). Elderly persons who are cognitively impaired can be assisted by others to perform this catheterization. Long-term antibiotic prophylaxis in people using long-term CIC is undesirable because it is ineffective and is associated with the emergence of resistant bacterial strains. In high-risk individuals, such as those with a prosthesis or those who are immunosuppressed, the risk and benefits must be individually reviewed. Complications occur in approximately 20 percent of persons with intermittent catheterization and include

urethritis, UTI, difficulty with insertion, urethral stricture, epididymitis, and bladder stones.

Among the frail elderly in nursing homes, the use of CIC results in the majority of patients developing bacteriuria and/or pyuria; yet no studies have reported pyelonephritis, sepsis, or renal calculus (Bennett and Diokno, 1984). In a study of the use of sterile catheters for intermittent catheterization in nursing homes, 11 percent (of 35) patients developed symptomatic infections. Further research is needed to resolve the appropriate use of sterile catheterization in nursing home populations.

Indwelling Catheters

Indwelling catheters may be needed for short-term treatment and terminally ill patients, but long-term use (more than 2-4 weeks) can lead to secondary problems.

An indwelling urethral (Foley) catheter is a closed sterile system inserted through the urethra to allow for bladder drainage. Indwelling catheters should be restricted to persons whose incontinence is caused by urinary retention that cannot be otherwise treated and for which alternative therapy is not feasible. Examples include acutely ill persons being monitored for fluid balance where incontinence interferes with necessary monitoring and terminally ill or severely impaired persons for whom bed and clothing changes are painful or disruptive. In situations where the severity of the incontinence and the complexity of the person's care have contributed to skin irritation or pressure ulcers (grade 3 or 4), an indwelling catheter may be indicated for short-term therapy until the skin condition resolves.

Recent studies suggest that approximately 50 percent of nursing home patients are incontinent and that approximately 2-4 percent will require urinary catheterization, but the actual prevalence measured in several nursing homes ranges from 2 to 28 percent (Ouslander, Greengold, and Chen, 1978a; Marron, Fillit, Peskowitz et al, 1983; Garibaldi, Brodine, and Matsumiya, 1981; Warren, Steinberg, Hebel et al, 1989). Indwelling catheter use in the homebound patient is especially high and requires supervision by a registered nurse and additional personal hygiene care by paraprofessionals. This increases the cost of caring for these persons (Jewes, Gillespie, Leadbetter et al, 1988).

Long-term use of indwelling catheters is also a significant source of bacteriuria and UTI. Bacteriuria develops in most persons within 2-4 weeks after catheter insertion (Bjork, Pelletier, and Tight, 1984; Warren, Tenney, Hoopes et al, 1982; Sabanathan, Castleden, and Mitchell, 1985). There are reported cases of sepsis and death from severe UTI. Among those with indwelling catheters in a nursing home population, mortality was three times higher than in noncatheterized patients, with significantly increased mortality in catheterized females (Kunin, Chin, and Chambers, 1987a,b). Other complications associated with indwelling catheters include obstruction secondary to encrustation, unprescribed removal, pain, bladder spasms, urethral erosion, stones, epididymitis, urethritis, periurethral abscess, chronic renal inflammatory changes, fistula formation, hematuria, and urinary leakage (Kunin, 1989; Ouslander, Greengold, and Chen, 1987a; Warren, Muncie, and Hall-Craggs, 1988).

Management of indwelling catheters varies. The usual practice is to change indwelling catheters every 30 days, but there are no data on the optimal frequency of catheter changes. If the patient has symptomatic UTI, the entire catheter and system must be changed and a new urine culture obtained when the new catheter is inserted (Rubin, Berger, Zodda et al, 1980; Grahn, Norman, White et al, 1985). No studies have identified an ideal catheter size, balloon size, or type of indwelling catheter, although most experts agree that the standard catheter size is 16FR or 18FR with a 5 or 10 cc balloon. There is evidence refuting the practice of catheter irrigation and clamping catheters prior to removal (Thompson, Haley, Searcy et al, 1984; Warren, Damron, Tenney et al, 1987). A person with an indwelling catheter must be reassessed periodically to determine whether a voiding trial or bladder retraining program may be effective in eliminating the indwelling catheter or whether a previously poor surgical risk patient may now be a surgical candidate for relief of obstruction.

Routine bladder irrigation is not only ineffective in eradicating bacteriuria but may also further disrupt the already damaged bladder epithelium, predisposing the patient to further infection (Ruwaldt, 1983).

It is not known which type of catheter (e.g., silicone, latex, Teflon) is best. Specific risks are difficult to assess because studies generally do not report the type or brand of catheter used. The development of silver-coated, antimicrobial, lubricous-coated, and female catheters may decrease the formation of encrustation and other complications; however, further research is needed with these products to determine their effectiveness (Liedberg, Lundeberg, and Ekman, 1990; Liedberg and Lundeberg, 1990; Brocklehurst, Hickey, Davies et al, 1988; Kunin and Finkelberg, 1971; Blacklock, 1986; Elliott, Gopal Rao, Reid et al, 1987).

Suprapubic Catheters

Indications include short-term use following gynecologic, urologic, and other types of surgery or as an alternative to long-term urethral catheter use in men.

Suprapubic catheterization involves percutaneous or surgical introduction of a catheter into the bladder through the anterior abdominal wall. Indications include short-term use following gynecologic, urologic, and other types of surgery or as an alternative to long-term catheter use in men. Suprapubic catheters are contraindicated in persons with chronic unstable bladder and urethral sphincter insufficiency. Immediate complications include cellulitis, hematoma, and bowel injury. Long-term complications are similar to those associated with the use of indwelling catheters (Feneley, 1983; Stower, Massey, and Feneley, 1989). Further studies are needed in the use of suprapubic catheterization for long-term management of UI. In the absence of data, it is the panel's consensus that a suprapubic catheter is preferable to an indwelling catheter in the male who requires chronic bladder drainage and for whom no other alternative therapy is possible because it eliminates urethral complications. There are, however, potential problems with the management of suprapubic catheters, such as uncontrolled urine leakage, skin erosion, and hematoma, and problems with catheter reinsertion. There is also a perceived problem with long-term medical management of suprapubic catheterization due to lack of knowledge and expertise of health care professionals and lack of quick access to medical care by the homebound patient if a problem arises. Educational efforts and further studies need to be implemented if the suprapubic catheter is to be used for long-term management of UI.

External Collection Devices

External (condom) catheters are devices made from latex rubber, polyvinyl, or silicone and are secured on the shaft of the penis by a double-sided adhesive, latex, or foam strap and are connected to urine collecting bags by a tube. Condom catheters should not be used in patients with chronic obstruction. Frail elderly males with cognitive impairment, not normally considered candidates for condom catheter use, should be evaluated for symptomatic UTI, urinary retention, and upper tract damage prior to use of these devices. Although external catheters are

External (condom) catheters may be useful for short-term maintenance.

Although external catheters are preferable to indwelling catheters for individuals who do not have urinary retention, they are associated with the occurrence of urinary tract infections.

preferable to indwelling catheters, they are also associated with UTIs (Johnson, 1983). There also is the potential for mechanical irritation from the friction caused by an external catheter (Jayachandran, Mooppan, and Kim, 1985). Therefore, the penis should be inspected daily. Careful attention must be given to avoid contact dermatitis, maceration of the penis, ischemia, and penile obstruction. Most complications result from improper and prolonged use of these devices. Also, persons with sensory loss secondary to neuropathy are unable to appreciate the potential for trauma to the area associated with improper use of the condom device (Ouslander, Greengold, and Chen, 1987b). Patients and their caregivers should be carefully instructed in the proper application of external catheters and taught to check for possible complications.

Female urine collecting systems are available, but their efficacy needs to be confirmed. Reported adverse reactions to the use of these devices include periurethral erythema and perineal itching (Johnson, O'Reilly, and Warren, 1989; Johnson, Muncie, O'Reilly et al, 1990).

Other Devices

Mechanical devices for males, such as penile clamps, are reserved for temporary use with ISD. Clamps must be removed at 3-hour intervals to empty the bladder. Several types are available; however, complications such as penile and urethral erosion, penile edema, pain, and obstruction can occur if clamps are improperly used.

Pessaries are doughnut-shaped devices made of rubber/silicone materials designed to reduce temporarily the pelvic prolapse and alleviate symptoms of pelvic relaxation in females with and without incontinence. Objective evidence regarding their effectiveness in reducing UI is not reported. However, they may represent an alternative for frail elders who are not candidates for other therapies. Specially trained nurses and physicians often fit and maintain pessaries. Complications can result when the pessary is misused or neglected and can include

ulceration of the vagina and rectovaginal and vesicovaginal fistula (Goldstein, Wise, and Tancer, 1990). Persons using pessaries require frequent and regular monitoring.

Absorbent Products

The long-term use of absorbent products should occur only after a basic evaluation by a health professional.

Absorbent pads and garments, either disposable or reusable, are widely used by persons with UI. The widespread use of this product is reflected by the growth of the market of disposable pads and adult diapers from $99 million in 1972, to $173 million in 1982, to $496 million in 1987. Many community-dwelling persons use these products because of the "protection" they afford. Others also resort to pads because when seeking help, they are dismissed rather than treated. From their perspective, absorbent products are useful and a very rational way to manage their problem. The absorbent products and garments include:

- Shields, which are small absorbent perineal inserts
- Undergarments, which consist of full-length pads usually held in place by waist straps
- Combination pad-pant systems
- Diaperlike garments
- Bed pads.

The quality, cost, and materials used in these products vary widely, but little objective evaluation of disposable products has been done. Studies comparing cloth protective garments with disposable products have been conducted, but research comparing effectiveness and adverse effects of the various disposable products is lacking (Hu, Kaltreider, and Igou, 1989).

Early dependency on absorbent pads may be a deterrent to continence, giving the wearer a sense of security and acceptance of the condition that removes their motivation to seek evaluation and treatment (Starer and Libow, 1985). Absorbent products when used improperly may contribute to skin breakdown and UTI. Thus, appropriate use, meticulous care, and frequent garment changes are needed.

Costs vary depending on the product and can be excessive for those on limited incomes (Brink, 1990). These costs currently contribute to about half of

the direct care costs for incontinence among residents in nursing homes (Sowell, Schnelle, Hu et al, 1987). Therefore, protective pads/diapers should only be used after all other specific treatment modes have been tried. The long-term use of absorbent products should only occur after a basic evaluation of the person's incontinence by health professionals. It can be offered as a choice or when appropriate treatment modalities have been exhausted.

The panel recommends the following factors be considered when absorbent products are used:

- Functional disability of the patient
- Type and severity of incontinence
- Gender
- Availability of caregivers
- Failure with previous treatment programs
- Patient preference
- Comorbidity.

4 Recommendations

Public Education

In 1988, the National Institutes of Health Consensus Development Conference on Urinary Incontinence in Adults concluded that there was an urgent need for efforts to inform and educate the public about this common problem (Eaton, 1988). Since then, public knowledge has increased somewhat, largely through the efforts of the Public Health Service publications and two self-help groups, Help for Incontinent People and the Simon Foundation. Letters regarding UI to a syndicated columnist, Ann Landers, have also gained widespread reader attention. Augmenting these activities are efforts by manufacturers who discuss UI through extensive media advertisements and one pharmaceutical company's pilot media program on UI (Mulcahy, 1990). These efforts need to increase, however, so that the entire public is made aware that UI is neither inevitable nor shameful but is, instead, treatable or at least manageable (Engel, 1978). The public should be encouraged to seek professional information and advice. A comprehensive and effective patient education program needs to detail assessment, treatment, behavioral, and supportive strategies including alternative options and side effects (Zion, 1988). Because the problem of incontinence crosses all social, economic, racial, and gender lines, educational programs need to be diverse, person- or consumer-friendly, and understandable in a variety of visual and print mediums (Glazer-Waldman, Hall, and Weiner, 1985). Teaching should be a collaborative effort involving medical, nursing, and allied health professionals in concert with education and communication experts and local, regional, and national government employers. Education needs to be individualized but also should be directed at

Increased efforts to inform and educate the public about incontinence are essential.

The public should be aware that incontinence is not inevitable or shameful but is treatable or at least manageable.

Patient education needs to be comprehensive and multidisciplinary in order to explain all management alternatives.

Research to test effectiveness of education programs is lacking and essential.

family and friends who will be involved in the person's care (McNeal, Salisbury, Baumgardner et al, 1984). Sharing experiences and education in a nonthreatening atmosphere is a major technique of UI support groups and should be encouraged.

Research to test educational effectiveness needs to be encouraged, developed, and evaluated, since specific research on UI patient teaching is lacking. Two teaching goals should be implemented:

- The misconceptions about UI should be corrected and information that incontinence can be helped should be disseminated to as wide an audience as possible.
- Patients with UI who seek health care need customized, yet flexible, patient teaching resources because of cultural, age, and educational differences.

To accomplish these goals, a multimedia approach is needed that can provide information and education about UI misconceptions and management options at the learner's own pace. Examples include use of public service announcements, public talk shows or interviews, health lectures, and toll-free telephone messages as well as pamphlets, booklets, audiotapes, videotapes, movies, slides, slide tapes, film strips, computers, and interactive videodiscs (Gartley, 1991; Jeter and Wagner, 1990; DiFlorio and Duncan, 1986). It is essential that teaching effectiveness be evaluated because instructing patients is not enough (Garding, Kerr, and Bay, 1988).

Similarly, knowledge on ways to prevent UI is lacking. Some examples of possible preventive maneuvers include teaching women about gestational and postpartum perineal exercises and teaching both men and women about scheduled voiding and proper bladder emptying techniques (Isaacs, 1985). When the public learns to better manage and/or seek early treatment for UI, it will reduce its personal, social, psychological, and economic costs—a toll that has been particularly costly to Medicare patients.

Professional Education

There is an urgent need to educate professionals, paraprofessionals, and survey teams about UI. First and foremost, information about UI should be included in the curricula of undergraduate and graduate health professional schools. Schools of nursing, physical therapy, physician assistants, etc., should consider educating specialists on incontinence care who can then serve as expert advisers to other health care professionals regionally, on the State level, in

Professionals and paraprofessionals need to be educated about the evaluation and treatment of UI.

teaching hospitals, and in every nursing home. To increase practitioners' knowledge of UI, continuing education courses focusing on the types of incontinence and appropriate diagnostic techniques and treatments should be provided. Professionals most likely to provide care to UI patients should be encouraged to attend these courses. Education on UI should also be part of the training programs for paraprofessional students, such as licensed vocational nurses, practical nurses, aides, and auxiliary workers in the community. Because UI is a major problem in long-term care settings, special emphasis should be directed toward encouraging alliances among all professionals responsible for the care of persons with UI.

Urinary incontinence outcome measures need to be developed for the use of nursing home surveyors so that they are better able to assess the effectiveness of interventions for UI in this setting.

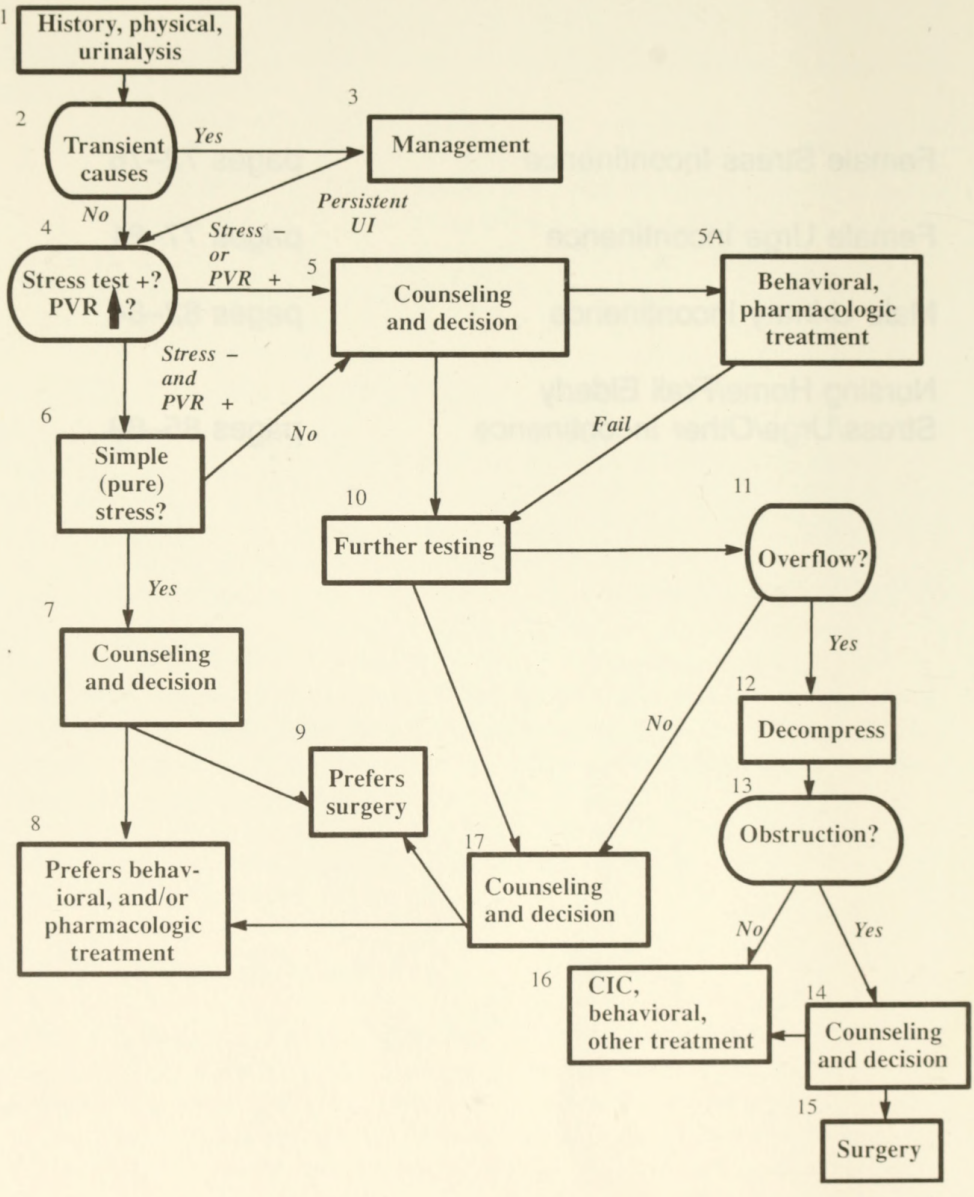
Scheduled Review

The UI panel recommends review of the guideline be responsive to new developments in UI research, training, product developments, practice, and patient participation. Because of the magnitude of literature produced each year, this guideline should be updated annually.

5 Algorithms

Female Stress Incontinence	pages 72–76
Female Urge Incontinence	pages 77–81
Male Urinary Incontinence	pages 82–84
Nursing Home/Frail Elderly Stress/Urge/Other Incontinence	pages 85–89

Female Stress Incontinence



Female Stress Incontinence

1. History, physical, and urinalysis (see section on basic evaluation, pp. 13-20).

2. and 3. Transient causes are identified and managed (see Table 1). If UI persists, go to node 4.

4. Provocative stress testing and measurement or estimation of post-void residual (PVR) volume should be performed at this point (see section on additional testing, pp. 15-20).

   Possibilities include:
   - Stress test positive for leakage and PVR normal—simple stress (pure), go to node 6.
   - Abnormal PVR regardless of stress test result—not simple stress, mixed stress and urge symptoms, go to node 5.
   - Stress test negative and PVR normal, go to node 5.

Simple (Pure) Stress Urinary Incontinence

6. Simple stress urinary incontinence is defined as follows:

   - Urine loss only with physical exertion (history and stress test)
   - Normal voiding habits (less than or equal to 8x/d and no more than 2x at night)
   - No neurologic history or neurologic findings
   - No prior anti-incontinence or radical pelvic surgery
   - Pelvic examination documenting hypermobility of the urethra and bladder neck, pliable and compliant vaginal wall, and adequate vaginal capacity
   - PVR normal
   - Not pregnant

   Any patient with stress incontinence who fails any of these criteria will be considered not to have simple or pure stress UI, go to node 5.

7. Patients with simple stress UI may be counseled regarding behavioral, pharmacologic, and surgical treatment options (see Tables 5, 6, and 7 on treatment outcome, and Chapters 2 and 3).

8. Treatment. If the patient prefers behavioral therapy, the recommended techniques are pelvic muscle exercises or bladder training with or without biofeedback and/or vaginal cones (see section on behavioral therapy, pp. 27-37).

   If the patient prefers pharmacologic therapy, the recommended agent is an alpha-adrenergic agent. For women with vaginal atrophy, a trial of estrogen therapy may be initiated alone or in combination with an alpha agonist (see section on pharmacologic therapy, pp. 38-47).

9. In patients with simple stress incontinence who prefer surgery, preoperative evaluation should include a comprehensive history, physical examination, urinalysis, urine culture, and PVR volume measurement. Document incontinence directly (positive stress test). For further corroboration, cystoscopy, cystogram with straining, Valsalva leak point pressure, and/or dynamic urethral profilometry may be used (see section on testing, pp. 15-20, and on further evaluation, pp. 21-25). The goal of surgical intervention in this case is to correct urethral hypermobility (see section on surgical treatment for hypermobility, pp. 53-55).

Stress Urinary Incontinence Other Than Simple

5. After stress testing and PVR estimation/measurement, all patients except those with simple stress UI will need further counseling and evaluation of disposition. The types of patients that will be encountered include:

   - Stress test negative and PVR normal
   - Stress test positive and PVR normal and symptoms are mixed/other/not simple stress UI
   - PVR elevated regardless of stress test result or symptom
   - Anatomically reversible condition including prolapsing cystocele, rectocele, enterocele, or uterus.

5A. Stress test negative and PVR normal

If the symptom of stress UI is simple and the PVR volume is low but incontinence cannot be documented with the stress test, the patient can be counseled either for a trial of behavioral therapy and/or pharmacologic treatment. Perform further testing if the initial therapy is not preferred or has failed (see sections on testing and further evaluation, pp. 15-25).

Stress test positive and PVR normal and symptoms are mixed/other/not simple stress

If the patient has mixed symptoms (stress/urge) or other symptoms and the stress test is positive and the PVR is low, the patient can be counseled for either trial of behavioral or pharmacologic therapy or surgical therapy. Further testing is recommended for patients who already failed initial therapeutic trial or have other comorbid conditions complicating the UI symptom (see section on further evaluation, pp. 21-25).

PVR abnormal

If the PVR is elevated regardless of the symptoms (simple stress UI, complex or mixed), further testing is recommended (see section on further evaluation, pp. 21-25).

Anatomically reversible conditions such as prolapsing cystocele, uterine prolapse, etc.

If an anatomically reversible condition is present, see the algorithm for urge UI (node 8).

10. Numerous specialized diagnostic tests are available, and the choice of tests must be tailored to the question to be answered.

    Tests for bladder and urethral function include filling cystometry, stress cystourethrogram, dynamic profilometry or Valsalva leak point pressure, pressure flow, and/or cystoscopy. Tests should be performed according to the need of the patient as described below (see sections on testing and further evaluation, pp. 15-25).

Suspected condition	Recommended test
Unstable bladder	Filling cystometry.
Stress UI	Dynamic profilometry or Valsalva leak point pressure and/or stress cystourethrogram or videourodynamics.
Overflow UI	Voiding cystometrogram (pressure flow study), cystoscopy, and/or stress cystourethrogram; videourodynamics is another option.

11. If overflow incontinence is found, the patient will need counseling regarding initial decompression of the bladder.

12. Decompression of the bladder may be accomplished with either intermittent self-catheterization or indwelling Foley catheter (see section on other measures and supportive devices, pp. 59-65).

13. Obstruction in women, as diagnosed in node 10, is usually due either to an anatomically reversible condition or to postsurgical obstruction of the urethra (see section on causes and types, pp. 6-11).

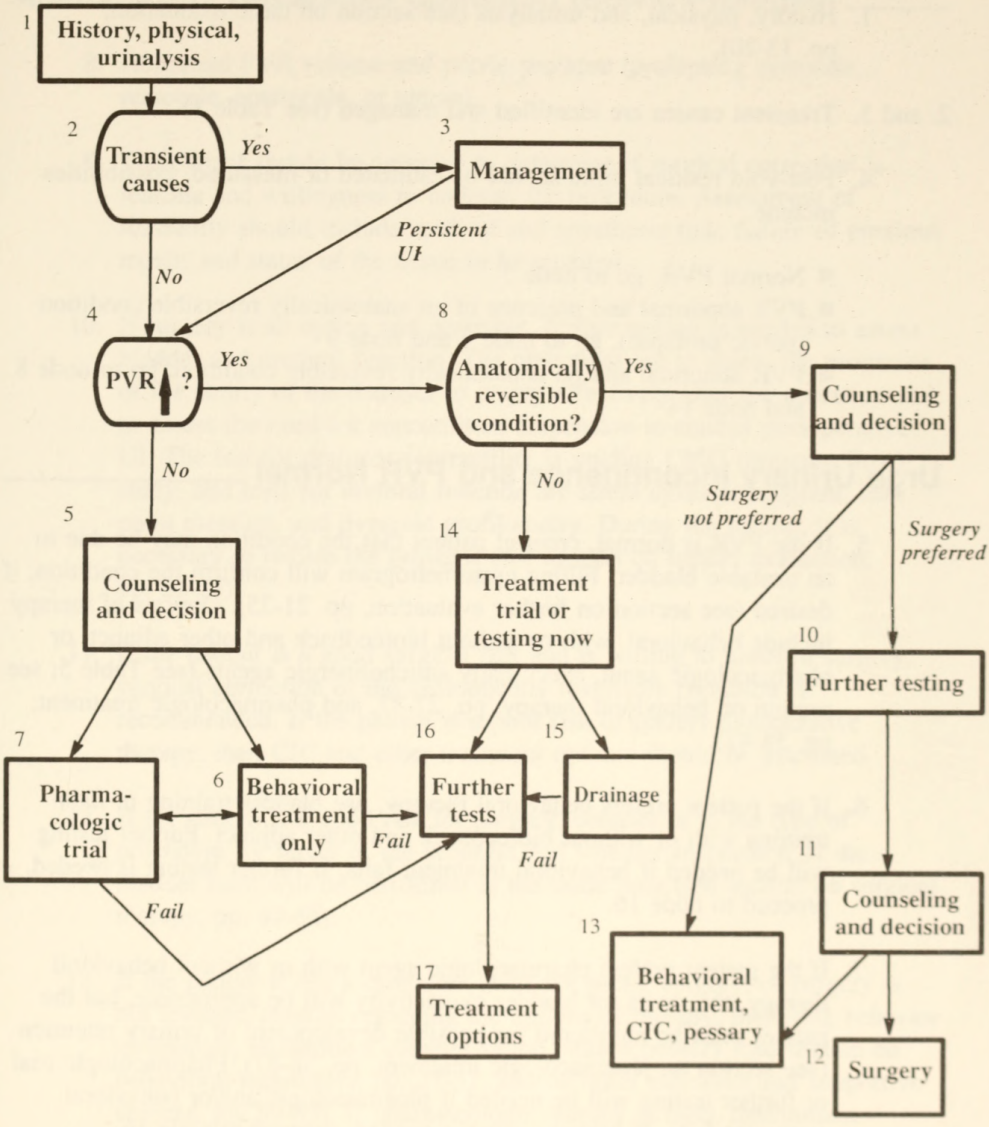
14. If the patient is a good surgical risk and is willing to undergo surgery, relief of obstruction is an option with the risk of recurrent stress UI. If the patient is a poor risk or prefers nonsurgical therapy, then clean intermittent catheterization (CIC) and other nonsurgical treatments should be instituted.

15. The patient should be counseled regarding the procedure for repair of the prolapse or relief of postsurgical urethral obstruction and told whether suspension of the bladder neck will be performed (see section on surgical treatment, pp. 47-58).

16. If there is no obstruction, as determined in node 10, and the patient has an acontractile or underactive detrusor, or if obstructed, the patient is either not a surgical candidate or prefers nonsurgical treatment, counseling regarding the use of CIC, behavioral voiding techniques, use of pessary, etc., is necessary. If bladder neck suspension is a consideration in the face of persistent abnormal residual volume, the patient must be counseled that persistent retention may result after the suspension procedure (see section on other measures and supportive devices, pp. 59-65).

17. If the patient is found to have no overflow incontinence in node 10, the specific condition identified after testing and the patient preference will determine treatment option. Options include behavioral, pharmacologic and surgical treatment. For surgical treatment of intrinsic sphincter deficiency (ISD), recommend bulking technique, sling, or artificial urinary sphincter (see Tables 3, 4, 6, and 7 and section on surgical treatment, pp. 47-58). If hypermobility is found, see node 7. If detrusor instability is found, see urge UI algorithm, node 5.

Female Urge Incontinence



Female Urge Incontinence

1. History, physical, and urinalysis (see section on basic evaluation, pp. 13-20).

2. and 3. Transient causes are identified and managed (see Table 1).

4. Post-void residual urine should be estimated or measured. Possibilities include:

   - Normal PVR, go to node 5
   - PVR abnormal and presence of an anatomically reversible condition (pelvic prolapse), go to node 8 and node 9
   - PVR abnormal and no anatomically reversible condition, go to node 8 and node 14

Urge Urinary Incontinence and PVR Normal

5. If the PVR is normal, counsel patient that the condition may be due to an unstable bladder. Filling cystometrogram will confirm the condition, if desired (see section on further evaluation, pp. 21-25). Options of therapy include behavioral, with or without biofeedback and other adjunct, or pharmacologic agent, specifically anticholinergic agents (see Table 5; see section on behavioral therapy, pp. 27-37, and pharmacologic treatment, pp. 38-47).

6. If the patient prefers behavioral therapy, use bladder training or habit training with or without biofeedback and other adjunct. Further testing will be needed if behavioral treatment fails. If further testing is needed, proceed to node 16.

7. If the patient prefers pharmacologic agent with or without behavioral therapy, the drugs for bladder overactivity will be appropriate, but the patient must be monitored for possible development of urinary retention (see section on pharmacologic treatment, pp. 38-47). Pharmacologic trial or further testing will be needed if pharmacologic and/or behavioral treatment fails. If further testing is needed, proceed to node 16.

Urge Urinary Incontinence and PVR Abnormal and Anatomically Reversible Condition (Pelvic Prolapse)

8. Abnormal PVR volume and pelvic prolapse (prolapsing cystocele, rectocele, enterocele, or uterus).

9. The patient should be assessed to determine if surgical correction is feasible and willingness to undergo the procedure. Assessment of feasibility should include medical and anesthesia risk, failure of previous repair, and status of the tissue to be repaired.

10. If surgery is an option and desirable, further testing is needed to assess bladder and urethral function. The objectives are to assess the prognosis of the ability of the detrusor to empty effectively after the operation and to assess the need for concomitant suspension to control postoperative UI. The test for detrusor contractility is voiding CMG (pressure flow) study, and tests for urethral function are stress cystourethrogram, leak point pressure, and dynamic profilometry. During the testing, it is necessary to reduce the prolapse (see section on further evaluation, pp. 21-25).

11. If the patient is a good surgical risk and is willing to undergo surgery, surgical correction of the anatomically reversible condition is recommended. If the patient is a poor risk or prefers nonoperative therapy, then CIC and other treatment options should be discussed.

12. If the patient is a good risk for surgery, counsel as to the type of procedure for repair of the prolapse and whether suspension of the bladder neck will be performed at the same time (see section on surgical therapy, pp. 47-58).

13. If the patient is not a candidate, does not prefer surgery, or surgery is not feasible, counsel regarding the options of therapy, including behavior techniques, intermittent catheterization, and/or pessary (see section on behavioral techniques, pp. 27-37, and on other measures and supportive devices, pp. 59-65). If pharmacologic therapy is used, intermittent catheterization will most likely be necessary.

Urge Urinary Incontinence and PVR Abnormal Without Anatomically Reversible Condition

8. Abnormal PVR and no anatomically reversible problems.

14. Common conditions encountered here include persistent postsuspension retention, underactive bladder, and DHIC (see section on causes and types of UI, pp. 6-11). Initial options are to counsel and encourage continued bladder decompression (CIC) and trial voiding with further testing (per node 16) if retention persists or to perform additional tests. The former is generally preferred as an initial option, since efficient bladder emptying function may be achieved with this technique.

15. For a nonneurogenic underactive bladder with no previous anti-incontinence surgery, intermittent catheterization can be implemented for a few weeks with the hope that the retention is transient. Similarly, a trial of voiding is also advisable after a short period (few days) of indwelling Foley catheterization. If the voiding trial fails or retention persists in spite of CIC, further testing is recommended. If patient succeeds with voiding trial, recommend bladder training program (see section on behavioral therapy, pp. 27-37).

    For neurogenic underactive bladder, intermittent catheterization is the treatment of choice (see section on other measures and supportive devices, pp. 59-65). If the neurologic lesion is not established but suspected, further testing is recommended to confirm the nature and extent of the neurologic lesion.

16. Persistent retention after failure of trial voiding and CIC or indwelling Foley catheter drainage may need further testing to rule out obstruction and DHIC. Testing should include voiding CMG (pressure flow) study, stress cystourethrogram, cystourethroscopy, and/or video urodynamics (see section on further evaluation and specialized tests, pp. 21-25).

    In patients with persistent urge UI who have failed an initial trial of behavioral or pharmacologic treatment, confirmation of detrusor overactivity can be accomplished with filling CMG. In the absence of detrusor overactivity, one must consider low compliant bladder and sensory urge (see section on types and causes of UI, pp. 6-11).

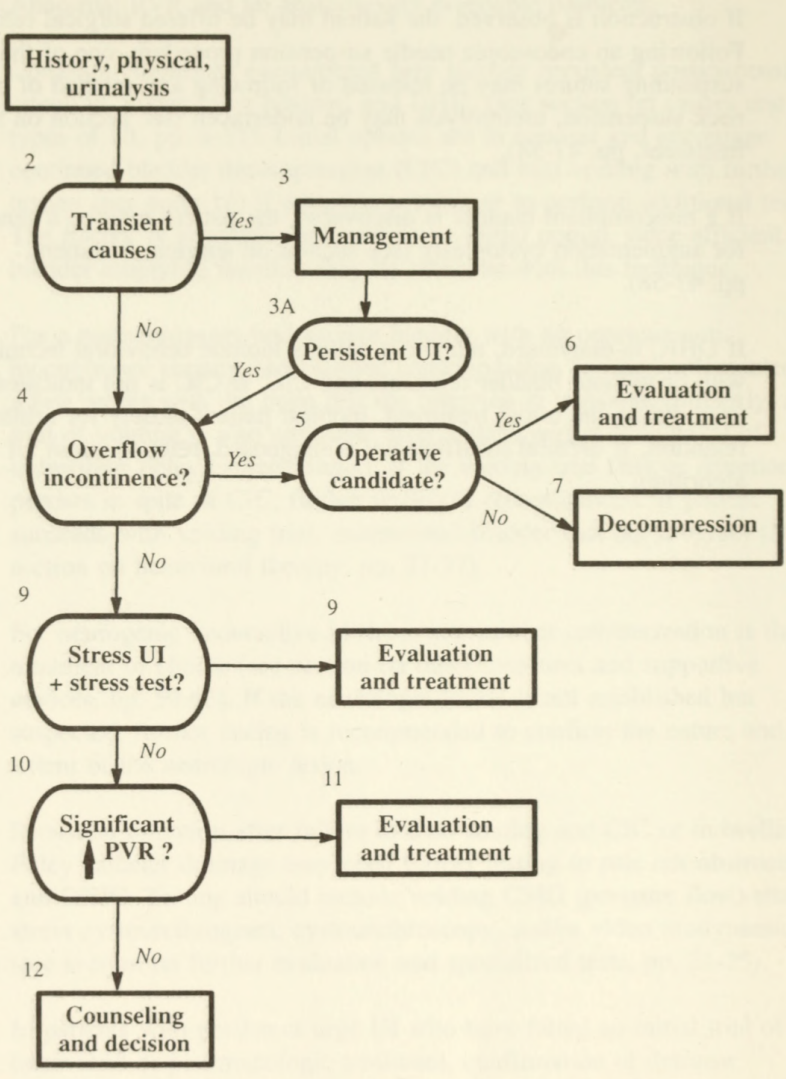
17. Treat based on outcome of further testing (node 16). If an underactive detrusor is found, CIC is recommended if feasible. Indwelling Foley catheterization should be a last-resort option.

    If obstruction is observed, the patient may be offered surgical relief. Following an endoscopic needle suspension procedure, one of the suspending sutures may be released or following any method of bladder neck suspension, urethrolysis may be undertaken (see section on surgical treatment, pp. 47-58).

    If a noncompliant bladder is discovered, the patient may be a candidate for augmentation cystoplasty (see section on surgical treatment, pp. 47-58).

    If DHIC is diagnosed, treatment options include behavioral techniques with or without bladder relaxants and CIC. If CIC is not indicated or not used during the initial treatment, monitor patient closely for urinary retention. If urethral insufficiency is diagnosed, refer to stress UI algorithm.

Male Urinary Incontinence



Male Urinary Incontinence

1. History, physical, and urinalysis (see section on basic evaluation, pp. 13-20). In addition to the standard evaluation, a careful examination of the prostate should be done. The presence of spinal cord lesions which can cause bladder dysfunction should be excluded—including upper motor neuron, cauda equina, and conus medullaris lesions.

   Because of the risk of hydronephrosis and prostate cancer in incontinent men, screening tests (BUN, creatinine, upper tract imaging, prostate-specific antigen) have been recommended by several authorities. In the absence of more definitive data, clinical judgment is indicated.

2. and 3. Identify and manage transient causes of UI (see Table 1). If treatment of transient causes does not correct incontinence, see node 4.

4. Overflow incontinence should be excluded in all men with incontinence. In men with overflow incontinence, the PVR volume generally exceeds 500 mL and it usually exceeds 600-700 mL. In rare cases in which the bladder is poorly compliant, a lower PVR volume may be encountered, but in these patients there is generally a history of radical surgery, radiation, or neurologic damage. PVR volume can be estimated by catheter, ultrasound, or physical examination (see p. 16).

5. and 6. Surgery. If operation for urethral obstruction in feasible and desired, further evaluation and treatment are indicated (see pp. 21-25). If obstruction is found, manage in accordance with existing BPH criteria.[1] If obstruction is not present, reversible neurologic causes of bladder weakness should be sought (e.g., lesions of the cauda equina, conus medullaris, and lumbosacral plexus), especially since such lesions may progress and subsequently cause paralysis.

7. Treatment. If the patient is not an operative candidate, the bladder should be decompressed. Consideration should also be given to detecting any potentially treatable neurologic lesions that could be causing overflow incontinence (see node 6, above).

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[1]The BPH guideline is expected to be released in 1992. For further information, contact AHCPR.

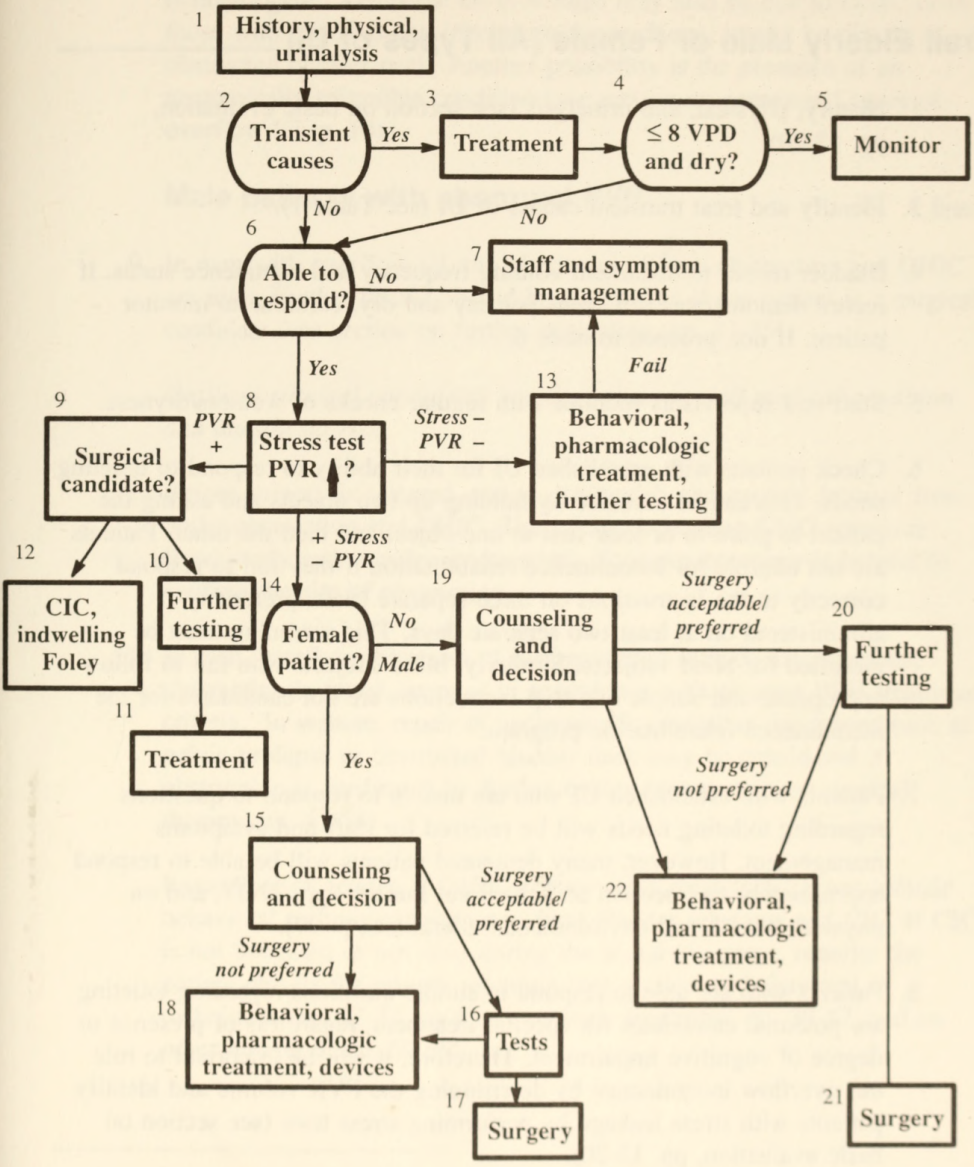
8. and 9. Further testing (stress UI). In general, male stress incontinence occurs only in the presence of urethral sphincter insufficiency and as a consequence of surgery, radiation, or neurologic disturbance. Further evaluation and treatment are necessary if surgery to correct the deficiency is desired (see pp. 51-53).

10. Low or intermediate PVR volume. Stress and overflow UI have essentially been ruled out.

11. Treatment. If the PVR is significantly elevated (see definition on p. 16), refer for further evaluation to differentiate primary causes of incontinence that remain, including urethral obstruction, DHIC, and less commonly, DSD (see pp. 21-25). Frail elderly patients may also benefit from referral since the management of obstruction with elevated PVR volume might differ from that for DHIC and DSD. However, clinical judgment should play a major role in this decision.

12. Counseling and decision. If the PVR volume is not significantly elevated, further options are possible. For the patient in whom surgery is feasible and desired, further evaluation should be undertaken to differentiate urethral obstruction from DH and DSD (see pp. 21-25). For patients in whom surgery is neither feasible or desirable, and in whom the risks of empiric therapy are acceptable, treatment for presumed detrusor instability can be undertaken as long as the patient is carefully monitored for the development of urinary retention (see pp. 40, 52). Other noninvasive treatments such as modification of voiding routines and pharmacologic treatment for obstruction (manage according to existing BPH criteria) are also recommended.

Nursing Home/Frail Elderly Stress/Urge/Other Incontinence



Nursing Home/Frail Elderly Stress/Urge/Other Incontinence

Frail Elderly Male or Female (All Types of UI)

1. History, physical, and urinalysis (see section on basic evaluation, pp. 13-20).

2. and 3. Identify and treat transient causes of UI (see Table 1).

4. Bladder record to document voiding frequency and continence status. If record demonstrates ≤ 8 voids per day and dry, continue to monitor patient. If not, proceed to node 6.

5. Staff and supervisors monitor with regular checks of wetness/dryness.

6. Check patients with established UI for their ability to respond to toileting needs. This can be assessed by holding up two objects and asking the patient to point to or look first at one object and then the other. Patients are not eligible for incontinence rehabilitation if they fail to respond correctly to the instructions on three separate trials, preferably administered on at least two separate days. This screening must be modified for blind subjects. Similarly, blind subjects who fail to follow appropriate and simple one-step instructions are not candidates for the incontinence rehabilitation program.

7. Patients with established UI who are unable to respond to questions regarding toileting needs will be referred for staff and symptoms management. However, many demented patients will be able to respond appropriately (see section on behavioral therapy, pp. 27-37, and on physical, social, and environmental alterations, p. 37).

8. Patients who are able to respond to simple questions regarding toileting are potential candidates for specific treatment, regardless of presence or degree of cognitive impairment. Therefore, it will be important to rule out overflow incontinence by determining the PVR volume and identify patients with stress leakage by performing stress tests (see section on basic evaluation, pp. 13-20).

Female patients with abnormal PVR

9. This is likely to be due to an underactive detrusor, either neurogenic or nonneurogenic. Overflow UI in women may also be due to DHIC or in those with previous anti-incontinence operations, it may be due to an obstructed bladder neck. Another possibility is the presence of an anatomically reversible condition (see section on causes and types of overflow UI, p. 10).

Male patients with abnormal PVR

9. In men with overflow UI, the likelihood of both obstruction and DHIC are high. Further testing should be undertaken if the patient is a surgical candidate (see section on further evaluation, pp. 21-25).

   Evaluate surgical candidates based on their overall medical condition and anesthesia risk.

10. Before surgery is selected, test to distinguish underactive detrusor from outlet obstruction and DHIC. These include voiding CMG (pressure flow) study and/or videourodynamics. Cystourethroscopy is helpful to confirm the site of obstruction.

11. In men, based on the result of further testing in node 10, if prostate obstruction is found, manage in accordance with existing BPH treatment criteria.[1] In women, repair of anatomically reversible conditions such as pelvic prolapse or obstructed bladder neck may be considered if obstruction is confirmed by further testing (see section on surgical therapy, pp. 47-58).

    Regardless of gender, if DHIC is diagnosed, treatment options include behavioral techniques with or without bladder relaxants and CIC. If CIC is not indicated or not used during the initial treatment, monitor the patient closely for urinary retention (see section on behavioral techniques, pp. 27-37, on pharmacologic treatment, pp. 38-47, and on other measures, pp. 59-65).

[1]The BPH guideline is expected to be released in 1992. For further information, contact AHCPR.

If an underactive detrusor is found, use clean intermittent catheterization if feasible. Indwelling Foley catheterization may be the other option if CIC is not feasible (see section on other measures and devices, pp. 59-65).

12. If the patient is not a surgical candidate, or there is no obstruction and the problem is an underactive detrusor, options include augmented voiding techniques, intermittent catheterization, or indwelling Foley catheter (see section on other measures and supportive devices, pp. 59-65).

    If DHIC is the cause, treat as for urge incontinence; if bladder relaxants are required in addition to behavioral interventions, monitor closely for urinary retention.

Stress test negative and PVR normal

13. Negative stress test and normal PVR (see section on discussion on additional tests, pp. 15-20).

    Although stress UI and urethral obstruction may still be the cause of incontinence, they are less likely. Options include behavioral techniques and pharmacologic trials. The decision will be based on the symptom of UI and the general condition of the patient. Prompted voiding is the preferred option if the patient is not capable of independent toileting. Further testing may be considered if the initial treatment fails (see section on further evaluation, pp. 21-25).

7. If the trial fails in node 13, the patient can be referred for staff and symptom management.

Frail Elderly Female With Stress UI

Stress test positive and PVR normal (female)

14. Female patient with positive stress test and low PVR (see section on testing, pp. 15-25).

15. Counsel regarding treatment options for presumed stress UI including behavioral, pharmacologic (alpha-adrenergic agonist), or surgical treatment.

16. Surgical candidate or surgery preferred. Tests are recommended to confirm the diagnosis and to determine the appropriate approach and prognosis. Confirmation of the diagnosis is needed because other diagnoses may mimic simple stress UI in nursing home patients (see section on further testing, pp. 21-25).

17. Surgery (for indications and discussion, see pp. 47-58).

Condition	Procedure
Hypermobility	Bladder suspension procedure.
ISD	Sling, bulking, artificial sphincter.
Anatomically reversible conditions	Pelvic surgeries.

18. Nonsurgical treatment preferred such as behavioral, pharmacologic, and/or devices (see appropriate sections in guideline).

Frail Elderly Male With Stress UI

Stress test positive and PVR normal (male)

14. Male patient with stress UI. Possibilities include postprostatectomy incontinence and low spinal lesions (rarely). If there is no history of urethral surgery, referral should be sought unless it is not justified by the patient's condition.

19. If there is no history of prostate or urethral surgery, further investigation is warranted to confirm stress UI and determine the cause. Treatment options for men with stress UI include behavioral techniques (see pp. 27-37), pharmacologic agents (see pp. 38-47), surgery (see pp. 47-58), or devices (see pp. 59-65). Decision should be made regarding the patient preference.

20. If patient is a surgical candidate and prefers surgery. Tests should be done to confirm the diagnosis since other diagnoses may mimic stress UI in nursing home patients (see section on further evaluation, pp. 21-25).

21. Surgical options for intrinsic sphincter deficiency in men include bulking and artificial sphincter.

22. Nonsurgical options include behavioral (pp. 27-37) and pharmacologic treatments (pp. 38-47) and devices (see pp. 59-65).

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Glossary

Absorbent products: Pads and garments, either disposable or reusable, worn to absorb uncontrolled urine flow. Absorbent products include shields, undergarment pads, combination pad-pant systems, diaperlike garments, and bed pads.

Agency for Health Care Policy and Research (AHCPR): A Federal agency established in December 1989 by Public Law 101-239 as the successor to the National Center for Health Services Research and Health Care Technology Assessment and part of the U.S. Department of Health and Human Services, Public Health Service. AHCPR is the main source of Federal support for research on problems related to the quality, delivery, and costs of health services. AHCPR is responsible for facilitating the development, review, and updating of clinically relevant guidelines to assist health care practitioners in the prevention, diagnosis, treatment, and management of clinical conditions. AHCPR also is responsible for developing a system of performance measures, standards of quality, and review criteria through which health care practitioners and others may review the provision of health care and assure its quality.

Algorithm: A step-by-step method for solving a problem. In health care decisionmaking, an algorithm is a defined and prescribed sequential process whereby clinical and diagnostic findings at a particular point in the process determine the next diagnostic, clinical, or therapeutic decision or action to be made or taken.

Anti-incontinence surgery: The use of surgical procedures to treat urinary incontinence (see artificial urinary sphincter, bladder suspension, periurethral bulking injections, sling procedures).

Artificial urinary sphincter: A mechanical device surgically implanted into the patient that consists of a cuff, placed around the bulbar urethra or bladder neck, a pressure-regulating balloon, and a pump. The device is used to control opening and closing of the urethra manually and is the most commonly used surgical procedure for the treatment of male urethral insufficiency.

Behavioral techniques: Specific interventions designed to alter the relationship between the patient's symptoms and his/her environment for the treatment of maladaptive urinary voiding patterns. This may be achieved by modification of the behavior and/or environment of the patient (see biofeedback, bladder training, electrical stimulation, habit training, pelvic muscle exercises, prompted voiding).

Benign prostatic hyperplasia (BPH): A common disorder of men over the age of 50 characterized by enlargement of the prostate which may press against the urethra and obstruct the flow of urine. BPH is the most common cause of such anatomic obstruction in elderly men.

Biofeedback: A behavioral technique by which information about a normally unconscious physiologic process is presented to the patient and the therapist as a visual, auditory, or tactile signal. The signal is derived from a measurable physiologic parameter which is subsequently used in an educational process to accomplish a specific therapeutic result. The signal is displayed in a quantitative way, and the patient is taught how to alter it and thus control the physiologic process.

Bladder suspension: Also called bladder neck suspension. A term for several surgical procedures employed to treat urethral hypermobility by elevating and securing the bladder to its proper position within the body. The two major types of bladder suspension surgical procedures are:

> **Retropubic suspension**: Consists of several different surgical techniques performed through a low abdominal incision. All techniques are designed to elevate the lower urinary tract within the retropubic space, differing only in the structures used to achieve the elevation.
>
> **Needle bladder neck suspension**: Consists of several different surgical techniques performed through a vaginal approach and small low abdominal incision; all involve the use of a long needle to transfer the sutures adjacent to the urethra and bladder neck through the retropubic space into the abdominal wall anterior to the rectus fascia where the sutures are fastened or anchored.

Bladder training: A behavioral technique that requires the patient to resist or inhibit the sensation of urgency (the strong desire to urinate), to postpone voiding, and to urinate according to a timetable rather than to the urge to void.

Catheterization: Techniques for managing urinary incontinence that involve the use of a slender tube inserted through the urethra or through the anterior abdominal wall into the bladder, urinary reservoir, or urinary conduit to allow urine drainage (see indwelling catheters, intermittent catheterization) or techniques that involve the use of external collection devices attached to the genitalia for channeling urine into a collection bag via a tube (see condom catheters, external (condom) catheters).

Clinical practice guidelines: A set of systematically developed statements or recommendations designed to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances. Such guidelines are designed to assist health care practitioners in the prevention, diagnosis, treatment, and management of specific clinical conditions.

Condom catheters: A condomlike device placed over the penis to allow bladder drainage and collection of urine (see external (condom) catheters).

Cystometry: A test used to assess the function of the bladder by measuring the pressure/volume relationship of the bladder. Cystometry is used to assess detrusor activity, sensation, capacity, and compliance. There are different variations of the test depending on the problem being investigated, but regardless of the technique, cystometry involves insertion of a catheter into the bladder.

Cystourethrography: The use of x-ray imaging to examine the urinary bladder and urethra. In voiding cystourethrography, an x-ray picture of the bladder and urethra is obtained during urination.

Cystourethroscopy: Also called cystoscopy. A procedure used to diagnose urinary tract disorders and provide a direct view of the urethra and bladder by inserting a flexible scope into the urethra and then into the bladder.

Decreased bladder compliance: A failure to store urine in the bladder caused by the loss of bladder wall elasticity and of bladder accommodation. This condition may result from radiation cystitis or from inflammatory bladder conditions such as chemical cystitis, interstitial cystitis, and certain neurologic bladder disorders.

Detrusor: General term for any part of the body that pushes down. In the urinary system, the detrusor muscle is the smooth muscle in the wall of the urinary bladder that contracts the bladder and expels the urine.

Detrusor external sphincter dyssynergia (DSD): An inappropriate contraction of the external sphincter concurrent with an involuntary contraction of the detrusor. In the adult, DSD is a common feature of neurologic voiding disorders.

Detrusor hyperactivity with impaired bladder contractility (DHIC): A condition characterized by involuntary detrusor contractions in which patients either are unable to empty their bladder completely or can empty their bladder completely only with straining due to poor contractility of the detrusor.

Detrusor instability (unstable bladder): Involuntary detrusor contraction in the absence of associated neurologic disorders (see urge incontinence).

Electrical stimulation: The application of electric current to stimulate or inhibit the pelvic viscera or their nerve supply in order to induce a therapeutic response directly.

Electromyography (EMG): The study of electrical potentials generated by the depolarization of muscle. EMG of the striated urethral sphincter measures the integrity and function of its nerves and is used to evaluate the neurophysiologic status of the urinary tract during filling and voiding.

External (condom) catheters: Devices for externally draining the bladder made from latex rubber, polyvinyl, or silicone that are secured on the shaft of the penis by some form of adhesive and are connected to urine collecting bags by a tube.

Habit training: A behavioral technique that calls for scheduled toileting at regular intervals on a planned basis. Unlike bladder training, there is no systematic effort to motivate the patient to delay voiding and resist urge.

Hydronephrosis: Dilation of the renal pelvis and calices, and sometimes, collecting ducts, secondary to obstruction of urine flow by calculi, tumors, neurologic disorders, or any various congenital anomalies.

Hypermobility of bladder neck: A condition characterized by the descent and displacement of the urethra and bladder neck from their normal anatomic position during physical exertion, usually resulting in leakage of urine. This condition is the most common cause of stress urinary incontinence. Various surgical procedures can be employed to treat this condition (see bladder suspension).

Hyperreflexia: Any exaggeration of reflexes. In urinary incontinence, an involuntary detrusor contraction resulting from a neurologic disorder.

Indwelling catheters: Tube devices inserted into the bladder, urinary reservoir, or urinary conduit for a period of time longer than one emptying.

Intermittent catheterization: The use of catheters inserted through the urethra into the bladder every 3-6 hours for bladder drainage.

Intrinsic sphincter deficiency (ISD): A cause of stress urinary incontinence in which the urethral sphincter is unable to contract and generate sufficient resistance in the bladder, especially during stress maneuvers. ISD may be due to congenital sphincter weakness, such as myelomeningocele or epispadias, or it may be acquired subsequent to prostatectomy, trauma, radiation therapy, or sacral cord lesions.

Involuntary detrusor contraction: A cause of urinary incontinence resulting from uncontrolled contractions of the detrusor.

Mixed urinary incontinence: The combination, in a patient, of urge urinary incontinence and stress urinary incontinence (see urge incontinence, stress incontinence).

Nocturnal enuresis: The involuntary loss of urine (urinary incontinence) during sleep. Also called bed-wetting.

Omnibus Budget Reconciliation Act (OBRA): OBRA (Public Law 101-239) was the legislation that established the Agency for Health Care Policy and Research on December 19, 1989.

Overactive bladder: A condition characterized by involuntary detrusor contractions during the bladder filling phase, which may be spontaneous or provoked and which the patient cannot suppress.

Overflow incontinence: The involuntary loss of urine associated with overdistension of the bladder. Overflow incontinence results from urinary retention that causes the capacity of the bladder to be overwhelmed. Continuous or intermittent leakage of a small amount of urine results.

Pelvic muscle exercises: A behavioral technique that requires repetitive active exercise of the pubococcygeus muscle to improve urethral resistance and urinary control by strengthening the periurethral and pelvic muscles. Also called Kegel exercises.

Periurethral bulking injections: A surgical treatment for urethral sphincter insufficiency that involves injecting materials such as polytetrafluoroethylene or collagen into the periurethral area to increase urethral compression.

Pessaries: Devices for women that are placed intravaginally to treat pelvic relaxation or prolapse of pelvic organs.

Pharmacologic treatment: The use of medications to treat urinary incontinence.

Post-void residual (PVR) volume: The amount of fluid remaining in the bladder immediately following the completion of urination. Estimation of PVR volume can be made by abdominal palpation and percussion or bimanual examination. Specific measurement of PVR volume can be accomplished by catheterization, pelvic ultrasound, radiography, or radioisotope studies.

Prompted voiding: A behavioral technique for use primarily with dependent or cognitively impaired persons. Prompted voiding attempts to teach the incontinent person awareness of his/her incontinence status and to request toileting assistance, either independently or after being prompted by a caregiver.

Sensory urgency: Urgency associated with bladder hypersensitivity (see urge/urgency).

Sling procedures: Surgical methods for treating urinary incontinence involving the placement of a sling, made either of tissue obtained from the person undergoing the sling procedure or of tissue obtained from another source, under the urethrovesical junction and anchored to retropubic and/or abdominal structures.

Stress incontinence: A form of urinary incontinence characterized by the involuntary loss of urine from the urethra during physical exertion; for example, during coughing. The stress incontinence symptom or complaint may be confirmed by observing urine loss coincident with an increase in abdominal pressure in the absence of a detrusor contraction or an overdistended bladder (see hypermobility of bladder neck and intrinsic sphincter deficiency).

Suprapubic cystostomy: A surgical procedure involving insertion of a tube or similar instrument through the anterior abdominal wall above the symphysis pubis into the bladder to permit urine drainage from the bladder.

Transient urinary incontinence: Temporary episodes of urinary incontinence that are reversible once the cause or causes of the episode(s) are identified and treated.

Ultrasonography: A technique that uses ultrasound to obtain visual images of the urinary tract for the purpose of assessing its anatomic status.

Underactive bladder: A condition characterized by a bladder contraction of inadequate magnitude and/or duration to effect bladder emptying in a normal timespan. This condition can be caused by drugs, fecal impaction, and neurologic conditions such as diabetic neuropathy or low spinal cord injury or as a result of radical pelvic surgery. It also can result from a weakening of the detrusor muscle from vitamin B_{12} deficiency or idiopathic causes. Bladder underactivity may cause overdistension of the bladder, resulting in overflow incontinence (see overflow incontinence).

Urethral pressure profilometry (UPP): A technique used to measure resting and dynamic pressures in the urethra.

Urethral sphincter mechanism: The segment of the urethra that influences storage and emptying of urine in the bladder. It controls bladder voiding by relaxing, which opens the outlet from the bladder, allowing urine to flow from the bladder to the outside of the body. A deficiency of the urethral sphincter mechanism may allow leakage of urine in the absence of a detrusor contraction.

Urge incontinence: The involuntary loss of urine associated with an abrupt and strong desire to void (urgency). Urge incontinence is usually associated with the urodynamic findings of involuntary detrusor contractions or detrusor overactivity (see detrusor external sphincter dyssynergia, detrusor hyperactivity with impaired bladder contractility, detrusor instability, hyperreflexia, sensory urgency).

Urge/urgency: A strong desire to void.

Urinary incontinence (UI): Involuntary loss of urine sufficient to be a problem. There are several types of UI, but all are characterized by an inability to restrain urinary voiding (see mixed urinary incontinence, nocturnal enuresis, overflow incontinence, stress incontinence, transient urinary incontinence, urge incontinence).

Urinary tract: Passageway from the pelvis of the kidney to the urinary orifice through the ureters, bladder, and urethra.

Urinary tract infection (UTI): An infection in the urinary tract caused by the invasion of disease-causing micro-organisms, which proceed to establish themselves, multiply, and produce various symptoms in their host. Infection of the bladder, better known as cystitis, is particularly common in women, mainly because of the much shorter urethra, which provides less of a barrier to bacteria.

In men, infection is usually associated with obstruction to the flow of urine, such as prostate gland enlargement.

Urodynamic tests: Tests designed to determine the anatomic and functional status of the urinary bladder and urethra (see cystometry, electromyography, urethral pressure profilometry, uroflowmetry, videourodynamics).

Uroflowmetry: A urodynamic test that measures urine flow either visually, electronically, or with the use of a disposable flowmeter unit.

Vesicoureteric reflux: Backflow of urine from the bladder into the ureter, unilaterally or bilaterally, during rest or especially during urination. The condition may be congenital, secondary to obstruction of the urinary outflow tract, or any disease involving the urinary ureteral orifices.

Videourodynamics: A technique that combines the various urodynamic tests with simultaneous fluoroscopy. Fluoroscopy is a technique for examining internal structures by viewing the shadows cast on a fluorescent screen by objects or parts through which x-rays are directed.

Voiding or bladder diary (record): Also called an "incontinence chart." A record maintained by the patient or caregiver that is used to record the frequency, timing, amount of voiding, and/or other factors associated with the patient's urinary incontinence.

Urinary Incontinence Guideline Panel: Biosketches

Kathleen Ann Krym McCormick, PhD, RN, FAAN
(Panel Co-Chair)
Director
Office of the Forum for Quality and Effectiveness in Health Care
U.S. Public Health Service

Dr. McCormick, a nurse, educator and researcher, is the Surgeon General alternate to the National Library of Medicine Board of Regents and the Secretary's Alzheimer Task Force. Her research focuses on cardiopulmonary physiology, gerontology, incontinence, and computer applications in nursing research. Dr. McCormick is a Fellow of the Gerontological Society of America, American College of Medical Informatics, American Academy of Nursing, and the Royal College of Nursing, Australia. She co-directed the Geriatric Inpatient Continence Research Program which was co-funded by the National Institute on Aging and the Health Care Financing Administration. She is editor of Urinary Incontinence in the Elderly, Nursing Clinics of North America.

Ananias C. Diokno, MD
(Panel Co-Chair)
Chief
Department of Urology
William Beaumont Hospital

Dr. Diokno is a urologic surgeon, researcher, and educator. A clinical professor of surgery and urology at the University of Michigan, he is a member of the Editorial Board of *Geriatric Nephrology and Urology* and serves as a reviewer for *JAMA*, the *Journal of Urology*, and *Investigative Urology*. Dr. Diokno is presently a principal investigator of NIH grants on geriatric urinary incontinence and on interstitial cystitis. In addition to being a board-certified urologist and a Fellow of both the American College of Surgeons and International College of Surgeons, he is the current secretary-elect of the North Central Section of the American Urological Association. Dr. Diokno is a past president of the Michigan Urological Society and Philippine American Urological Society. A prolific researcher, he has won numerous scientific awards.

Joyce Colling, PhD, RN, FAAN
Chair, Community Health Care Systems Department
School of Nursing
Oregon Health Sciences University

Dr. Colling is a nurse and professor specializing in issues of gerontology. She has contributed much to research on incontinence in the frail elderly in the community and particularly in long-term care settings, with emphasis on staff education to improve incontinence care. She is a special reviewer of grant proposals for the National Institute of Aging and the National Center for Nursing Research and is a fellow of the American Academy of Nursing and the Gerontological Society of America.

J. Andrew Fantl, MD
Director, Obstetrics/Gynecology Urodynamic Unit
Medical College of Virginia

Dr. Fantl, a surgeon and professor of obstetrics and gynecology at the Medical College of Virginia, has published a wealth of research on urinary incontinence in the past 14 years. He has investigated the effectiveness of behavioral therapy for urinary incontinence and has worked with the National Aeronautics and Space Administration to develop a urodynamic pressure sensing catheter. Dr. Fantl is a former president of the American Urogynecologic Society and president-elect of the Society of Gynecologic Surgeons.

Richard M. Loughery, BA, FACHA
Consultant
McLean, Virginia

Until recently, Mr. Loughery served as special assistant and director of the Advisory Committee Office of the Secretary of the Department of Health and Human Services, Public Health Service. In this position, he advised the secretary about a variety of health care and policy issues. For over 20 years he was the chief executive officer and president of the Washington Hospital Center, a 910-bed teaching hospital. He has served in leadership positions with the American Hospital Association and the American College of Hospital Administrators.

Diane Kaschak Newman, MSN, RN, CNP
President
Golden Horizons, Inc.

Ms. Newman is an adult nurse practitioner, consultant, and educator. She provides incontinence services in acute-care and long-term facilities for adult patients. She has developed a home care service to treat homebound incontinent clients and provides evaluation and behavioral therapies for urinary incontinence. Ms. Newman has published numerous nursing articles on incontinence and has conducted research on incontinence in the elderly. She is an Adjunct Clinical Preceptor at the University of Pennsylvania Graduate School of Nursing.

Joseph G. Ouslander, MD
Medical Director, Director of Research and Education
Jewish Homes for the Aging of Greater Los Angeles

Dr. Ouslander is associate professor of medicine in the Multicampus Division of Geriatric Medicine and Gerontology at the University of California, Los Angeles School of Medicine, associate director of the Borun Center for Gerontological Research, and director of the Continence Program and Urodynamic Laboratory at Encino Hospital. Dr. Ouslander has served on several national and international panels on urinary incontinence, has published numerous research articles on incontinence and has coauthored two books. He currently serves on the Board of Directors of the American Geriatrics Society and the California Association of Medical Directors and has served on the Geriatric Medicine Test Committee of the American Board of Internal Medicine/American Board of Family Practice.

Betty D. Pearson, PhD, MSN, MAN
Associate Professor
School of Nursing
University of Wisconsin-Milwaukee

Dr. Pearson is a nurse, educator, and researcher, whose research in the past decade has focused on incontinence prevention and noninvasive management strategies. A former American Nurses' Foundation Scholar and current elected member of the Association of Continence Advisors (United Kingdom), Dr. Pearson has taught nursing for more than 20 years.

Shlomo Raz, MD
Professor and Surgeon
Department of Surgery, Division of Urology
University of California, Los Angeles School of Medicine

A surgeon and educator for more than 20 years, Dr. Raz currently is an editorial board member for the *Journal of Neurourology and Urodynamics*, *Urology Times*, *Journal of Neurologic Rehabilitation*, and *Journal of Applied Urodynamics*. He has won numerous awards for his clinical research as well as his educational endeavors in the area of urinary incontinence. He is a member of 15 professional medical societies, has served on many committees, and is a former president of the Urodynamic Society. Prior to his appointments at UCLA, Dr. Raz was a staff physician at Hadassah University Hospital in Israel and was co-chief of the Section of Urology at Sepulveda Veterans Administration Hospital in California.

Neil M. Resnick, MD
Chief, Division of Gerontology
Brigham and Women's Hospital

Dr. Resnick is a member of the Urology Division of the West Roxbury VAMC and assistant professor of medicine at Harvard Medical School. He has won numerous awards for his research on urodynamics and urinary incontinence. Dr. Resnick developed and directed the Continence Center at Brigham and Women's Hospital and also devised the incontinence module for the Health Care Financing Administration's Assessment System and Data Base for Nursing Home Residents to be used by all U.S. nursing homes. He is associate editor of the *Journal of Gerontology* and member of the editorial board for *Neurology and Urodynamics*; he is also a member of the Nutritional Prostate Health Council of the American Foundation of Urological Disease and a member of the governing board of the Simon Foundation for Continence.

Thomas J. Rohner, Jr., MD
Chief, Division of Urology
The Milton S. Hershey Medical Center
Pennsylvania State University College of Medicine

Dr. Rohner, a surgeon and urologist, is professor of surgery at Pennsylvania State University College of Medicine. His research focuses primarily on interstitial

cystitis, prostate cancer, and urinary incontinence. Dr. Rohner is a member of the editorial board and consultant to the *Journal of Urology* and was president of the Society of University Urologists in 1991. He is a consultant to the Veterans Administration Hospital, Hospital for Children and Youth, and Pilhaven Hospital in Pennsylvania and serves on committees for the American Cancer Society, American College of Surgeons, American Urological Association, and Pennsylvania Blue Shield.

John F. Schnelle, PhD
Director and Professor-in-Residence
Borun Center for Gerontological Research
UCLA School of Medicine and Jewish Home for the Aging

Dr. Schnelle is associate director of the Borun Center for Gerontological Research and a professor-in-residence at the Multicampus Division of Geriatric Medicine and Gerontology, School of Medicine, University of California, Los Angeles. He is renowned for his role as principal investigator on several major clinical trial intervention grants designed to improve care and management in nursing homes and has received awards for his outstanding contributions to behavior therapy. Among his most notable contributions is his innovative work in incontinence care, comprehensively described in his book, *Management of Urinary Incontinence Care in the Frail Elderly*. Dr. Schnelle has published extensively in the areas of quality control in institutional settings and quality of life issues in the frail elderly, with over 60 publications in professional books and journals. He currently serves on the board of editors of the *Journal of Organizational Behavior Management*.

Jeannette M. Tries, MS, OTR
Director
Biofeedback and Incontinence Centers
Sacred Heart Rehabilitation Hospital

Ms. Tries is president of the Clinic for Neurological Learning and is a consultant to the University of Illinois Incontinence Service within the Colon-Rectal Surgery Department. A registered occupational therapist and certified biofeedback therapist, Ms. Tries has developed neuromuscular reeducation and incontinence biofeedback programs. She is past president of the Biofeedback Society of Wisconsin, board member of the Biofeedback Certification Institute of

America, as well as consultant to faculties developing electromyographic neuromuscular reeducation and incontinence programs. Ms. Tries has a strong interest in development of behavioral and reeducation strategies for the neurologically impaired.

Vernon C. Urich, MD
Chief
Urology Section and Urodynamic Lab
Phoenix VA Medical Center

Dr. Urich is a urologist, surgeon, and educator, whose main interest is patient education. He was president of the Michigan Urological Society in 1990 and was on that Society's Board of Directors for 5 years. He is currently a member of the board of directors of the International Patient Education Council, the editorial board of *Patient Education and Counseling*, and the board of trustees of the Center for Gerontology. Prior to recent relocation, he was assistant clinical professor of surgery at Michigan State University and instructor in urology at the University of Michigan.

Michael S. Vernon, MD
Director
Geriatrics Division
East Carolina University School of Medicine

Dr. Vernon is a physician and educator specializing in family medicine and geriatrics. He is a member of the editorial board for the fourth edition of *Clinical Aspects of Aging*, serves as a peer review editor of *American Family Physician*, and is former associate editor of *Family Medicine Monograph*. Dr. Vernon is also a member of the aging committee for the North Carolina Academy of Family Physicians, consults various groups on geriatric program development and fellowships, and serves as a research grant reviewer for the U.S. Veterans Administration.

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Availability of Guidelines

For each clinical practice guideline developed under the sponsorship of the Agency for Health Care Policy and Research (AHCPR), several versions are produced to meet different information needs.

The *Guideline Report* contains the clinical practice guideline with complete supporting materials, including background information, methodology, scientific evidence tables, and a comprehensive bibliography.

The *Clinical Practice Guideline* and the *Quick Reference Guide for Clinicians* are companion documents for use as desk-top references for clinical decisionmaking in day-to-day care of patients. Recommendations, algorithms or flow charts, tables and figures, and pertinent references are included.

A Patient's Guide, available in English and Spanish, is an informational booklet for the general public to increase consumer knowledge and involvement in health care decisionmaking.

Guideline information also will be available for on-line retrieval through the National Library of Medicine, the National Technical Information Service, and some computer-based information systems of professional associations, nonprofit organizations, and commercial enterprises.

To order guideline products or to obtain further information on their availability, call the AHCPR Clearinghouse toll-free at 800-358-9295, or write to: Center for Research Dissemination and Liaison, AHCPR Clearinghouse, P.O. Box 8547, Silver Spring, MD 20907.

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